FOUNDRY

OCTOBER
1957

A PENTON PUBLICATION

Big Aluminum Castings . . . .

form sections of molds for production of earth-moving machine tires—p. 142

✔ New Investment Casting Methods—p. 94

✔ Lightening the Atomic Cannon—p. 100

✔ Molding with the CO_2 Process—p. 104

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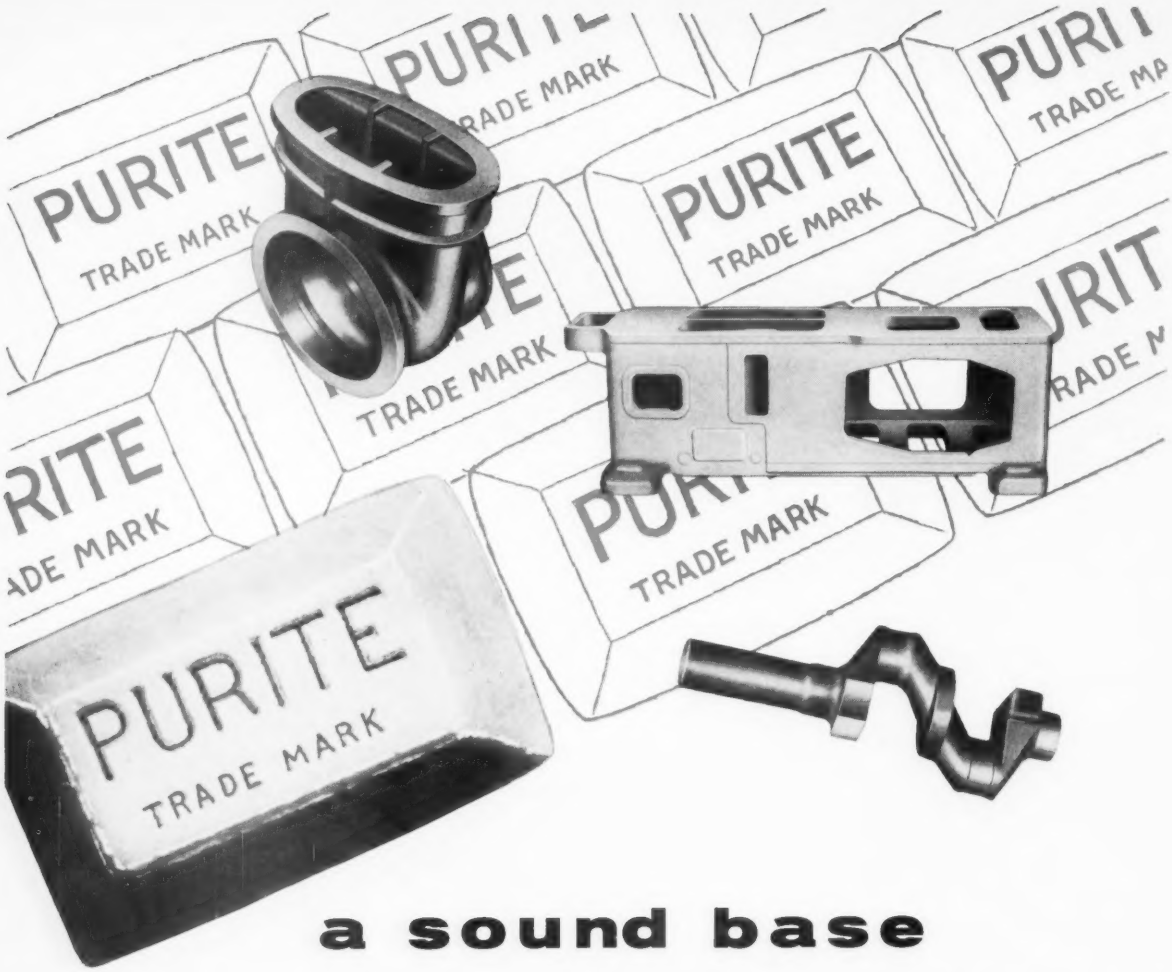

a sound base for quality castings

Assures smooth mixing and melting. Purite flux in the cupola increases fluidity of the charge, speeds combustion reactions, and prevents bridging.

Cures high-sulphur scrap. In both cupola and ladle, Purite is an efficient desulphurizer producing clean, quiet-pouring iron of the desired sulphur specification.

Convenient and economical. Each Purite pig is two pounds of pure, non-crumbling fused soda ash. No inert waste or dust; no expensive equipment. Easily stored; easily used . . . you measure the amount you need by counting.

Used for over 30 years. The convenient pigs of fused soda ash are a familiar sight everywhere. Purite is distributed by leading supply houses in the U.S.A. and Canada. For the name of the one nearest you, or for further information, write today.

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MATHIESON

PURITE

OLIN MATHIESON CHEMICAL CORPORATION

INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MARYLAND

4357

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Auto camshaft shows...

How hardenable Nickel Cast Irons Help sell more wear resistant castings

Automotive camshafts have been made of nickel cast iron for 25 years.

Today's autos have greater compression and higher lift valves. They subject camshafts to wearing conditions far more severe than ever before. Yet hardenable nickel cast iron still provides a sufficiently wear resistant material for camshaft to take this service. And so do a thousand other engineered castings.

Nickel Cast Irons provide better response to heat treatment for better wear resistance

Nickel Cast Irons have outstanding response to heat treatment—whether you flame or induction harden. In fact, nickel cast iron surfaces can be brought to higher Rockwell hardnesses (500 BHN minimum) more uniformly, for small cams or long machine tool ways. This assures superior wear resistance.

And nickel cast irons offer other benefits. Higher strength levels permit more efficient design, enable parts to carry higher loads. Outstanding machinability makes possible important savings in machining time and effort.

So when you have a job that requires superior wear resistance, for machine tool ways, for cams, for gears or for dies, think of nickel cast irons. Consider them in terms of your reputation for engineered castings—and consider the value of your customer's satisfaction.

There are many grades of nickel cast iron. Inco will be glad to help you formulate the right grade for your customers. Just write.

NICKEL CAST IRONS:

Best for you because they're best for your customers.

INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

Considering all the different kinds of sand additives on the market today—it's easy to understand how sand preparation might be quite a problem. But, here are just three additives that have been providing exactly the "right combination" for hundreds of foundries, all over the country. By adding them to sand in varying amounts, all the important sand characteristics can be closely controlled and changed at will, to satisfy specific requirements. They combine to provide more uniform mold hardness, better finish, better shakeout and more readily salable castings. And—common lake, river or beach sand can be used for replacement, without danger of grain size going out of balance. Finally, what's most important—*the cost of these three additives won't exceed $1.00 per ton of castings produced!*

Here's a quick run-down on the characteristics and capabilities of these FEDERAL sand additives:

CROWN HILL SEACOAL

For controlling carbon content. High in volatile, combustible material. Exceptionally low in sulphur content — which means your castings will have more easily-machined surfaces. Produced by FEDERAL at Crown Hill, West Virginia — ground or granulated to properly match the sand used.

FEDERAL GREEN BOND BENTONITE

The only pure, unadulterated, untreated bentonite — with *natural* low viscosity yet high green and dry compression strength. Cuts down on mulling time and permits slurry users to add 25% more bond (bentonite) per gallon of slurry, for strength desired, without strain on pumping system. Possesses many times the natural bonding power of any other sand bond. Truly the best of the bentonites! Mined in Wyoming and South Dakota, processed and guaranteed by FEDERAL.

FEDERAL SAND STABILIZER

For providing greater flowability and better shakeout. A processed cellulose sand additive whose high combustibility allows sand to expand evenly to eliminate casting defects. Increases sand flowability to permit green strength to be run higher, and to provide better ramming conditions. Attracts moisture to broaden the safe moisture range. Provides better, less lumpy shakeout, without adding other clays to sand mixtures.

It might be very helpful to investigate FEDERAL'S "right combination" — write today for your copy of our sand-preparation booklet—"Tailor-Made Molding Sands".

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

FEDERAL WAREHOUSES—Chicago, Cleveland, Cranston, R. I., Crown Hill, W. Va., Detroit, Los Angeles, Milwaukee, Minneapolis, New York, Richmond, Syracuse, Upton, Wy.

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FOUNDRY

A PENTON PUBLICATION

October 1957

Volume 85—Number 10

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(For addresses of branch offices, see Page 291)

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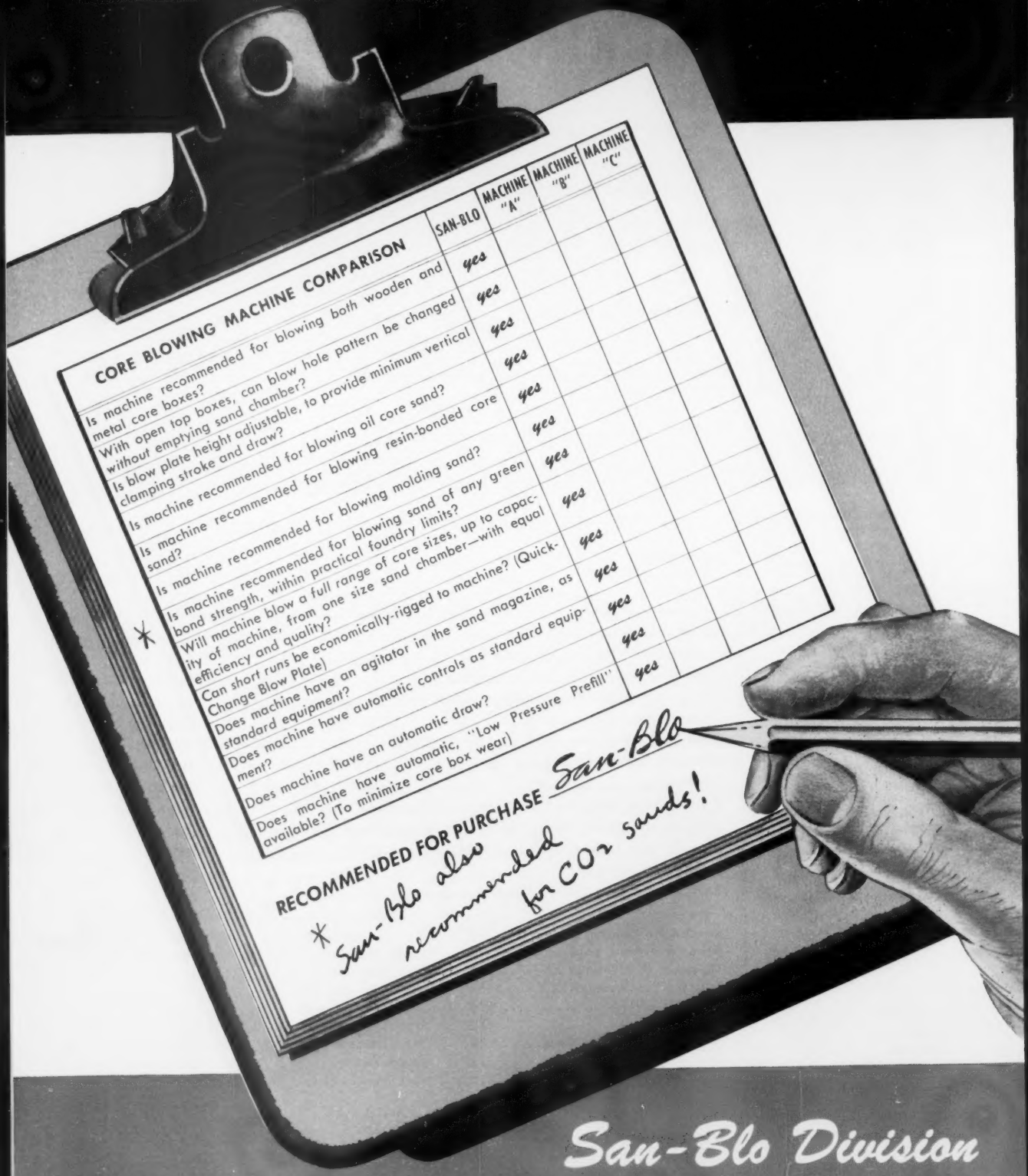
MORE VALUE FOR YOUR MONEY



CORE BLOWING MACHINE COMPARISON

	SAN-BLO	MACHINE "A"	MACHINE "B"	MACHINE "C"
Is machine recommended for blowing both wooden and metal core boxes?	yes			
With open top boxes, can blow hole pattern be changed without emptying sand chamber?	yes			
Is blow plate height adjustable, to provide minimum vertical clamping stroke and draw?	yes			
Is machine recommended for blowing oil core sand?	yes			
Is machine recommended for blowing resin-bonded core sand?	yes			
Is machine recommended for blowing molding sand?	yes			
Is machine recommended for blowing sand of any green bond strength, within practical foundry limits?	yes			
Will machine blow a full range of core sizes, up to capacity of machine, from one size sand chamber—with equal efficiency and quality?	yes			
Can short runs be economically-rigged to machine? (Quick-Change Blow Plate)	yes			
Does machine have an agitator in the sand magazine, as standard equipment?	yes			
Does machine have automatic controls as standard equipment?	yes			
Does machine have an automatic draw?	yes			
Does machine have automatic, "Low Pressure Prefill" available? (To minimize core box wear)	yes			

* San-Blo also recommended for CO_2 sands!

RECOMMENDED FOR PURCHASE San-Blo

San-Blo Division

The **FEDERAL FOUNDRY SUPPLY** Company

4600 EAST 71st STREET · CLEVELAND 5, OHIO

A SUBSIDIARY OF ARCHER • DANIELS • MIDLAND COMPANY

Circle 555 on Inquiry Card—Page 51

WITH SAN-BLO

FOR CO_2 CORES...

MANY FOUNDRIES ARE NOW USING STANDARD SAN-BLO MACHINES *WITHOUT* SPECIAL ATTACHMENTS OR ALTERATIONS

CO_2 sand is just another mixture to SAN-BLO core blowers. Feel free to call on us for help with any of your CO_2 core problems.

A model "250" SAN-BLO in a production foundry, blowing cores weighing up to 250 lbs. each.

ARCHER QUALITY

A model "40" SAN-BLO in a steel foundry, blowing runner cup cores.

B.F.Goodrich report:

Photo courtesy of Whirl-Air-Flow Corp., Chicago, Illinois.

Pipe carries sand the easy way

B. F. Goodrich improvements in rubber brought extra savings

Problem: In this foundry, workmen used to push wheelbarrows loaded with sand to the coremakers. Now the sand is simply blown through those overhead pipes to hoppers all over the building. Only one trouble.

A flexible hose was needed to switch the sand from one pipeline to another. (See inset.) Rubber hose was tried. The swirling sand quickly wore holes in it. Another kind stretched so much from the constant flexing that it jammed the switch.

What was done: When a B.F.Goodrich man heard of the problem he recommended a hose, specially developed by B.F.Goodrich to handle rough materials. It is made with a special wear-resisting rubber, so tough it outlasts hard steel 10 to 1 on many jobs. The hose has a specially treated fabric reinforcement that keeps it from stretching.

Savings: The B.F.Goodrich hose was tried. Instead of digging in and cutting, the sharp particles of sand simply bounce off the extra-soft rubber lining. It has now given 2 years of service and shows no signs of wear or stretch. In fact, the company making this equipment is now using only B.F.Goodrich hose.

For information: This hose is one of hundreds of kinds B.F.Goodrich makes for thousands of industrial uses. Your B.F.Goodrich distributor can recommend a hose exactly fitted to meet the special requirements of your work. And, as a factory-trained specialist, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept.* M-178, *Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

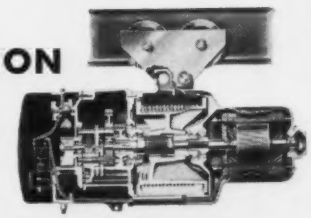
Circle 556 on Inquiry Card—Page 51

Circle 557 on Inquiry Card→

WRIGHT Electric Hoists / for lowest final cost

These features make WRIGHT Speedway Hoists your best buy for—

MORE PRODUCTION

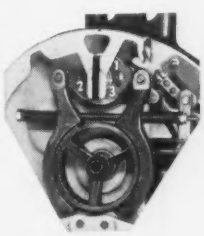


Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

LONGER LIFE

Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

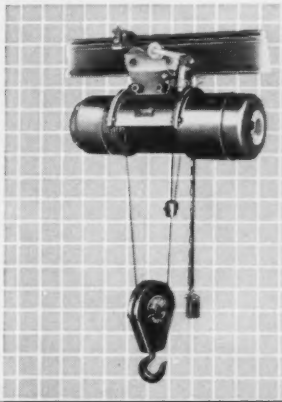
EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

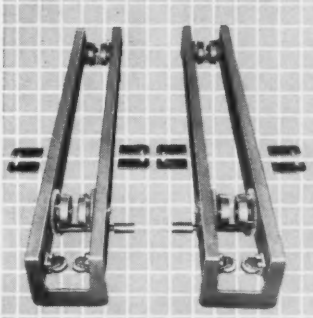
Better performance at lower cost by using WRIGHT units for local-built cranes

SPEEDWAY ELECTRIC HOIST



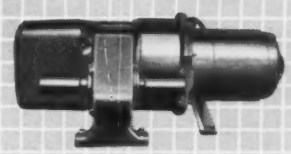
Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

END TRUCKS



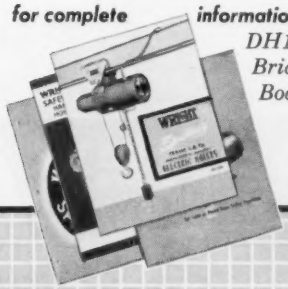
For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

CRANE DRIVE UNIT



For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

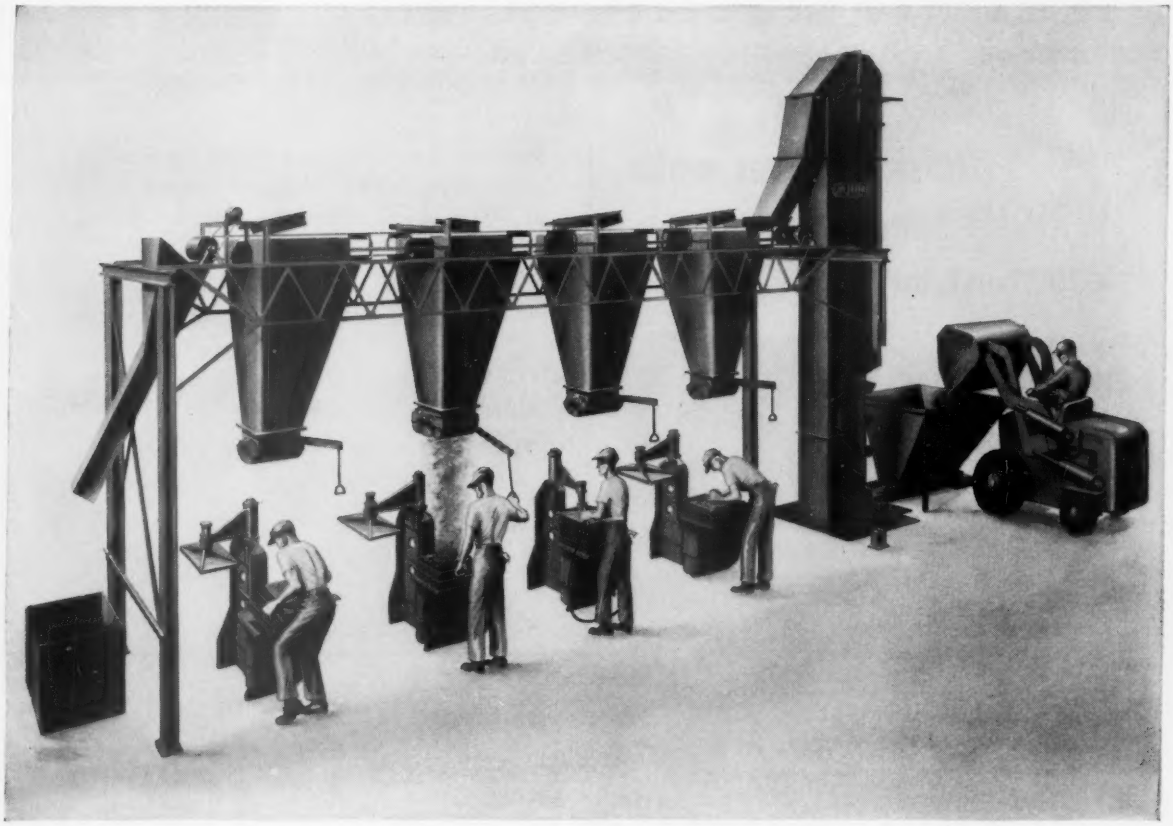
for complete information on WRIGHT *Hoists and Crane components ask for:* **Speedway Hoists:** *(Frame 1) Booklet DH133B, (Frame 2 & 3) Catalog E55A.* **Motor Driven Cranes:** *Underhung, Single Bridge, Bulletin #227; Top Running, Bulletins #DH448 or DH449* • **Crane Drive Units:** *Booklet DH-431A* • **Hand Traveling Cranes:** *Bulletins #DH-468 and #DH-348B*



Wright Hoist Division
AMERICAN CHAIN & CABLE

ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.



Small foundries gain big foundry advantages with the **JEFFREY** Overhead Sand System

Available for 2, 4, 6 and 8 or more stations

EVEN with as few as two molding stations, you can economically install this Jeffrey overhead sand system. Molders' time is saved, their work made easier. No more having to lift the sand from the floor, because sand flows directly from overhead hoppers into the flasks.

Your molding costs are reduced, production is speeded up, workers are happier.

These Jeffrey overhead sand units were designed to meet the small foundry's need for low-cost equipment that gives it big-foundry advantages. Built as package units, savings made through reduced engineering and manufacturing costs are passed along to you. For detailed information, get in touch with The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

HERE'S HOW IT WORKS

An LMV vibrating conveyor delivers conditioned sand from the hopper to the bucket elevator. It discharges sand directly into the hopper of a 2-station unit—onto the belt conveyor of larger units—from which plows divert it into the hoppers. Thus sand is always available on the molding line.

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

JEFFREY

Circle 558 on Inquiry Card—Page 51

only COLEMAN Dielectric® CORE OVENS

are built by foundry oven experts

Coleman Dielectric Core Ovens are engineered and built to provide every essential feature for better, faster core baking — electronically. Only Coleman can give you all of the following advantages:

1 SPECIALIZED FOUNDRY OVEN EXPERIENCE

Foundry ovens are our business . . . not a sideline. Coleman Dielectric Core Ovens are the product of over half a century of specialized experience in the design and construction of ovens for every foundry need.

2 AUTOMATIC CONTROL MECHANISMS

Automatic Load-Monitor controls conveyor operation . . . permits baking a greater variety of cores without constant adjustments . . . prevents shut-downs due to overloading. Automatic Grid Control adjusts power tube to varying loads. Recycle overload system automatically restores oven to operation after momentary overload, shuts down oven if unsafe condition persists.

3 COMPLETELY SAFETY ENGINEERED

All components are protected by locked doors and safety interlock system that instantly shuts off high voltage circuit when any door is opened.

4 SIMPLIFIED PUSHBUTTON CONTROLS

Motorized electrode, conveyor and power controls located on convenient, centralized panel. Electric meter indicates electrode height in inches.

5 FULLY ENCLOSED UNIT CONSTRUCTION

Oven, power generator and conveyor are combined into one compact unit for Greater Efficiency . . . Simplified Installation.

Coleman Dielectric Core Ovens are posting spectacular production records in Aluminum, Brass and Bronze, Gray Iron, Magnesium, Malleable and Steel Foundries.

For an unbiased opinion about the suitability of dielectric core baking for your foundry, consult a Coleman Oven Engineer. As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best for your needs . . . we make them all.

WRITE FOR BULLETIN 657

• Bucyrus-Erie Company, Erie, Pa., can turn out 2000-3000 pounds of phenolic resin bonded cores per hour in their Coleman Model 75CD-6019 Dielectric Core Oven. Cores range in size from one pound to over 100 lbs.

• This Coleman Model 60CD-4814 Dielectric Core Oven serves two high speed automatic core blowers, each filling ten plastic multi-cavity blow-in driers per minute, at The Schaible Company, Cincinnati, Ohio.

A COMPLETE RANGE OF TYPES AND SIZES . . .

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens • Car-Type Core Ovens • Car-Type Mold Ovens • Transrack Ovens • Rolling Drawer Ovens • Portable Core Ovens • Portable Mold Dryers • Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

MEMBER FEMA

60 TONS

of hot castings daily

Every 16-hour day, 60 tons of castings with temperatures to 250° F. ride this Imperial Belt. The belt is Imperial* Standard Rexall—Impregnation 615 (117′ x 30″ x 5 ply)—a brand developed for the rugged requirements of this abrasive foundry service.

Long service life—Installed in 1953, this belt has been in continuous operation at the Chambers, Bering, Quinlan Co., a jobbing foundry. Such long life is the result of Imperial's superior manufacturing processes that include exclusive double stitching and special impregnating compounds.

These features are described fully in Imperial's NEW Belting Catalog and Engineering Handbook, an extremely helpful and cost-saving publication for every user of industrial belting. Use the coupon to order your copy today.

Reg. Trademark of Imperial Belting Co.

Imperial

BELTING COMPANY

1755 S. Kilbourn Ave., Chicago 23, Ill.

You expect MORE from Imperial . . . and you get MORE!

Mail this coupon today for NEW Belting Catalog and Engineering Handbook

Name_____

Address_____

_____

Circle 560 on Inquiry Card—Page 51

With the Editors

A POPULAR Series: Harry St. John's series of articles on "The Brass Foundry" has proved unusually popular. This interest has been evidenced by the numerous requests received for additional copies of the articles while the series was being published. The series is concluded with this month's installment—the 27th.

As the series progressed we finally were unable to fill requests for tearsheets of some of the earlier articles. It has been decided, therefore, to publish all 27 articles in book form. An announcement will be made as soon as the book is ready.

Incidentally, we hope to present additional articles by Mr. St. John during coming months which will deal with other aspects of foundry practice in the copper-base alloys.

—o—

Very Free Verse: Probably nobody will dispute the statement that Bill Walkins, Electric Steel Foundry Co., Portland, Oreg., the well known author of *Rammed Up and Poured,* is the outstanding poet of the foundry industry. Harold Henderson, the California Sandman, doesn't claim to be a rival for Bill's title, but he was inspired by some of the latter's verse to offer the following:

There's a sandman out in Portland
With a flair for rhymin' words
Who implies this casting business
Belongs strictly to the birds.
So I rise to take exception
To these snide remarks he's made,
Wherein he sneers contemshus like
At this 'ere foundry trade.

Now, he may have stomach ulcers
Or else, corns upon his toes;
For when he looks at molders
Boy, he's lookin' down his nose!
He says, "You take a coremaker,
Eliminate his brain,
And you've got yourself a molder!"
That's the gist of his refrain.

I'll admit that this guy Walkins
Is a clever sort o' freak.
Makes believe he hates the foundry,
But he writes with tongue in cheek.
And I'll bet you couldn't tempt him
To exchange his foundry berth
For a sinecure in Heaven
Nor for any job on earth!

Bill may gripe about his backache
And the whining of the cranes,
And insist that every molder
Is quite destitute of brains.
But he'll be a lonesome sandman
When he's climbed that golden stair,
Just to learn that not another
Brainless foundryman is there!

Yes, this feller name o' Walkins,
Out in Portland, gets real rough
With his rhymin' innuendo,
His philosophy, and stuff.
But I'll bet my bottom dollar
Once you've read *Rammed Up And Poured,*
You'll enjoy a new dimension
Foundry-wise—across the board!

—o—

The List Grows: Recent formation of the Aircraft Castings Association has raised to thirteen the number of technical, trade and other forms of organizations directly concerned with the foundry industry. The list would be even longer if we added the names of those groups which are interested in applications of castings but not exclusively so, such as the Aluminum Association and the Magnesium Association.

The new Aircraft Castings Association seeks the expanded use of ferrous castings in the aircraft and missile industries. Its formation is a tribute to the fact that a number of foundries have demonstrated that the casting process can meet the exacting requirements of aircraft and missile manufacturers.

—o—

Humor Wanted: The cartoons sprinkled through the pages of FOUNDRY are included with the hope they will provide our readers a chuckle or at least a smile. They are gleaned only after checking multitudes of suggestions from many cartoonists. It seems that after the cartoonist has run the gamut of the sand pile, corebaking, and melting departments, and has the various forms of material handling equipment rigged to do unauthorized assignments, the well apparently runs dry. Then the cartoonist becomes something less than a humorist.

The thought occurs that perhaps some of you on the firing line might have some cartoon slants that have escaped the sidelong glance of the cartoonists and the editors. Your ideas will be welcome.

—o—

Metalworking on Parade: During 1958, four of the nation's largest conventions will be held at Public Auditorium, Cleveland.

May 19-23 the 62nd Castings Congress and Show of the American Foundrymen's Society will hold forth at the huge showplace on Lake Erie. June 9-12 will see the Materials Handling Show taking the spotlight. From Sept. 23-26 the Association of Iron and Steel Engineers will be in session, and the annual National Metals Show of the American Society for Metals will draw international attention Oct. 27-31.

While it is a bit unusual to house four such shows under the same roof during the same year, Cleveland's civic leaders hope it is only the beginning of bigger and better things to come. New York and Cleveland financial interests are now actively laying the groundwork for expanded

Costly Copper Components Restored to FULL EFFICIENCY

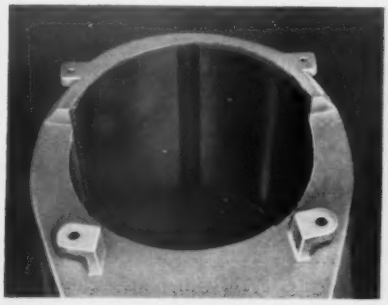
ELECTRODE HOLDERS, BUS TUBES, CABLE CLAMPS RENEWED BY PATENTED PROCESS AT SUBSTANTIAL SAVINGS

A major economic factor in the operating cost of electric arc furnaces is the expense of replacing costly copper components—electrode holders, bus tubes, cable clamps. To *reduce your costs*, Wilson Welding Company has developed an exclusive patented process for rebuilding, renewing and restoring these components to original specifications, to give performance and life expectancy *guaranteed* to equal that of a new unit, at *substantial savings to you*.

Steel plants and foundries throughout the United States and Canada have reduced down time and saved literally thousands of dollars by taking advantage of Wilson Welding Company's exclusive process. In many cases modifications and design changes to customers' requirements have been made.

You will want to know more about Wilson Welding Company's service. A letter or phone call will bring you detailed data promptly.

BEFORE REBUILDING, this electrode holder was badly burned, pitted and scarred, its efficiency impaired, with resulting higher operating costs. Concealed damage, not always apparent, was revealed when rebuilding began. In every case, cooling tubes are checked for leaks, and every rebuilt holder is subjected to thorough inspection and testing.



AFTER REBUILDING, the electrode holder shown at top looked like this. Its performance will be equal to or better than that of a new one. In this case a smooth contact surface was desired, but surfaces can be serrated, dimensions modified, and other design changes incorporated when desired. Work was completed and shipment made within five days after receipt of the damaged holder. Cost of restoring this holder was less than half replacement cost.

WW CO INC

Wilson Welding Company, Inc.

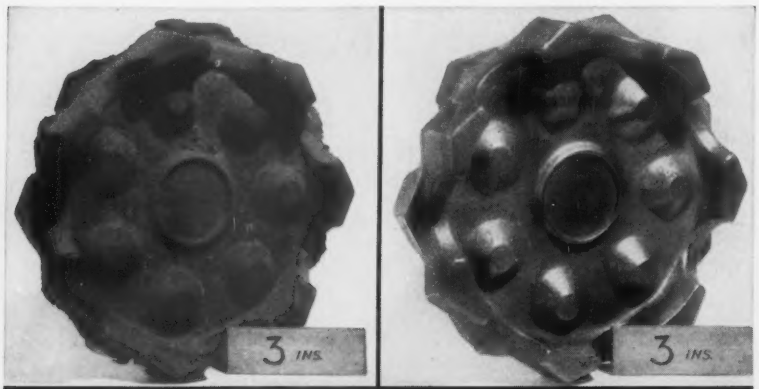
COPPER AND COPPER ALLOY WELDING

P. O. BOX 1634
221 HIGH STREET
ALTIZER ADDITION
HUNTINGTON, WEST VIRGINIA
PHONE JACKSON 3-6281

Foseco® COATINGS

for better as-cast finish

A smooth, well-finished casting naturally reflects careful foundry practice and greatly increases customer good-will and sales



you can see the difference . . . with Foseco TERRACOTE

Foseco TERRACOTES are ready bonded mold and core coatings for use in producing a smoother, cleaner skin on castings. They can be used on natural or synthetic sand molds and on any type of core sand.

Foseco TERRACOTES come in powder form and may be used as supplied, as a dry coating or mixed with water for dry sand work. Grades are available for iron, magnesium, aluminum, zinc and copper base alloys.

Foseco MOLDCOTE

Foseco MOLDCOTES are spirit-based coatings for application to molds and cores by spraying, painting or swabbing. The spirit base rapidly evaporates or may be burned off from the treated surface, leaving a firm, closely-adhering coating.

Foseco MOLDCOTES are primarily used in green sand work, but you can also obtain excellent results with dry and oil sand molds and cores. MOLDCOTES also produce outstanding results when applied to cores made by the Carbon Dioxide Process. Various grades of MOLDCOTES are available.

Use Foseco Coatings for better *as-cast finish in your foundry. Clip and mail the coupon* now *and we'll send you complete information on Foseco* TERRACOTE *and* MOLDCOTE *explaining how to use them in your foundry.*

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Send this coupon for your FREE leaflets giving all the facts on Foseco TERRACOTE and MOLDCOTE.

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Company_____

Address_____

City_____ State_____

convention, hotel, and parking facilities which eventually will provide finer accommodations than are now available.

One proposed plan envisions a 100 per cent increase in exhibition space, a new hotel, an office building, and adequate parking space all tied in with the present Public Auditorium. Plans of this magnitude are essential in keeping pace with the country's expanding industrial economy and the accompanying growth in number and size of exhibitions.

—o—

New Gray Iron Shapes: For many years gray iron foundrymen have been concerned with the problem of getting a little more sex appeal into

their products. One solution was offered recently with the introduction of large 60 in. GA Meehanite bars by the Compton Foundry, Compton, Calif.

The company's statically cast round bar stock (shown here) is manufactured in 11 sizes ranging from 3 to 8 in. in diam. The pleasant young lady in the foreground, in case you missed her, is Shirley Bonne.

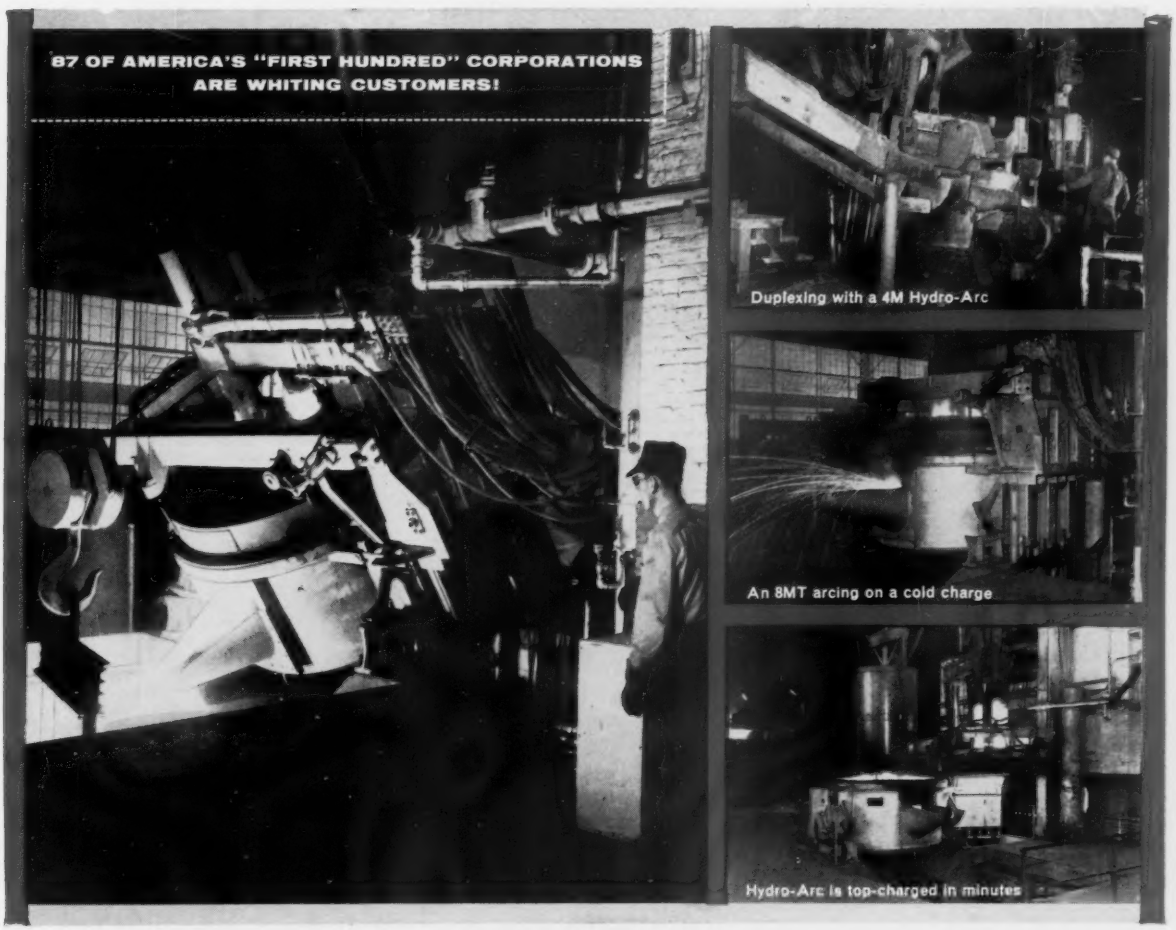
—o—

Change in Plans: Traditional scheduling of the two-day Michigan Regional Foundry Conferences at the end of the week has been upset, as one of the editors discovered just in time to rearrange his travel plans. The conference will be held on Wednesday and Thursday, Oct. 2-3, at East Lansing—and not on Thursday and Friday as in the past, and as was announced originally last spring.

—o—

On Vacation: Lest the reader mistakenly assume that the printer has transposed the initials of Editor F. G. S. at the bottom of this page, we hasten to advise that the latter did not write this month's column. Actually, those initials stand for "Steinebach's Gone Fishing."

S. G. F.


87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS
ARE WHITING CUSTOMERS!
Duplexing with a 4M Hydro-Arc
An 8MT arcing on a cold charge
Hydro-Arc is top-charged in minutes

Hydro-Arc...

Engineered for today's melting needs

Engineered for today's high production capacity, the Hydro-Arc Electric Furnace is the answer to all your prime melting and duplexing needs. It has fewer moving parts . . . is easy to operate and maintain—economical, too! New hydraulic power transmission . . . automatic clamp and arm for fast, safe electrode slipping . . . patented repositioning equipment for a constant arc even under the most adverse conditions—they're but three of the many advancements that upgrade melting efficiency, produce a better product. In addition, Hydro-Arc's top charging reduces down-time, helps assure more-melt-per-man-hour! Investigate Hydro-Arc today. Send for Bulletin FY-168, the booklet that gives the details! *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.*

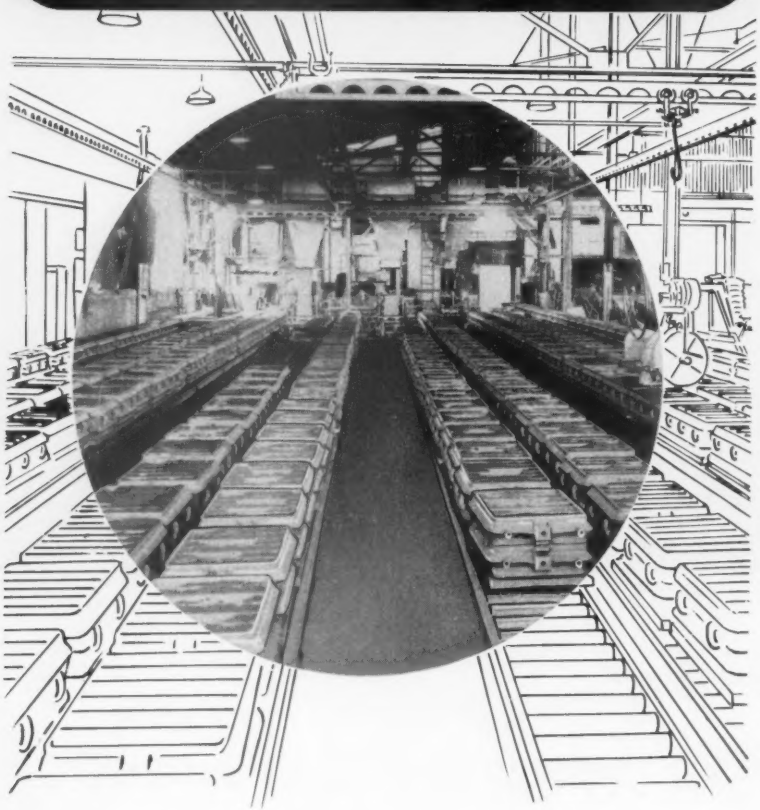
WHITING

FOUNDRY EQUIPMENT

Circle 563 on Inquiry Card—Page 51

MATHEWS

Engineers and Builders of Conveyers and Conveyer Systems for Foundries



Mathews engineers have been working with Foundry conveying problems for better than 50 years. In this time they have developed outstanding systems of gravity and power conveyers and special conveying machinery for handling flasks, molds, cores, and castings—through all stages of processing. They know what severe service is, and design equipment accordingly.

That's why—when you buy Foundry Conveyers—you get the best when you buy Mathews.

MATHEWS CONVEYER COMPANY

GENERAL OFFICES . . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MATHEWS

(Member Foundry Equipment Manufacturers Association)

Calendar of MEETINGS

Oct. 2-3 — Michigan Foundry Conference, Kellogg Center, Michigan State University, East Lansing, Mich.

Oct. 3-4—Refractories Institute, fall meeting, Grand Hotel, Point Clear, Ala.

Oct. 9-11—Gray Iron Founders' Society, annual meeting, Drake Hotel, Chicago.

Oct. 10-11—National Noise Abatement Council, annual meeting, Hotel Sherman, Chicago.

Oct. 12-16 — Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

Oct. 17-18—Magnesium Association, annual convention, Biltmore Hotel, New York.

Oct. 17-19—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 18-19—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 18-19—Northwest Regional Foundry Conference, Hotel Vancouver, Vancouver, B. C.

Oct. 21-25—National Safety Council, national safety congress and exposition, Conrad Hilton Hotel, Chicago.

Oct. 24-25—Niagara Frontier Regional Foundry Conference, Statler Hotel, Buffalo, N. Y.

Oct. 31-Nov. 1—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 2-8—American Society for Metals, national metals exposition and congress and 2nd world metallurgical congress, International Amphitheatre, Chicago.

Nov. 7-8—National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York.

Nov. 11-13—Steel Founders' Society of America, technical and operating conference, Hotel Carter, Cleveland.

Nov. 19-21—Investment Casting Institute, annual fall meeting, Sheraton Hotel, Chicago.

Dec. 4-6—American Institute of Mining, Metallurgical and Petroleum Engineers, electric steel furnace conference, Penn-Sheraton Hotel, Pittsburgh.

1958

Jan. 17—Malleable Founders' Society, semi-annual meeting, Hotel Cleveland, Cleveland.

Jan. 27-28—Industrial Heating Equipment Association, annual meeting, Penn-Sheraton Hotel, Pittsburgh.

Jan. 27-30—Plant Maintenance & Engineering Show, International Amphitheatre, Chicago.

Feb. 6-7—Malleable Founders' Society, technical and operating conference, Wade Park Manor, Cleveland.

Feb. 9-14—American Society for Testing Materials, committee week, Statler Hotel, St. Louis.

Feb. 13-14—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 20-21—Southeastern Regional Foundry Conference, Chattanooga, Tenn.

Mar. 12-13—Foundry Educational Foundation, college-industry conference, Hotel Statler, Cleveland.

Mar. 17-18 — Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

May 12-16—American Society for Metals, 1st Southwestern metal congress and exposition, Automobile Bldg., Dallas, Tex.

May 19-23—American Foundrymen's Society, 62nd annual convention and exhibition, Public Auditorium, Cleveland.

June 9-11, Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 9-12—National Materials Handling Exposition, Public Auditorium, Cleveland.

June 9-13—International Automation Exposition and Congress, Coliseum, New York City.

June 22-27—American Society for Testing Materials, annual meeting, Statler and Sheraton-Plaza Hotels, Boston, Mass.

Sept. 20-23—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

SNAGGING PROBLEMS GOT YOUR GOAT?

Butt definitely, a good way to meet the problems of HIGH CLEANING ROOM COSTS is . . . head on. Take your goat by the horns and switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding wheel development in years.

You'll see why our customers speak so highly of the fast, easy cutting action of CINCINNATI (PD) SNAGGING WHEELS. Our customers also report that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

Snagging wheel problems will never again get your goat, if you see your CINCINNATI Grinding Wheels Distributor. He'll be glad to give you full details on how (PD) WHEELS will save you money on snagging and increase your production. Or contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—only CINCINNATI Grinding wheels give you

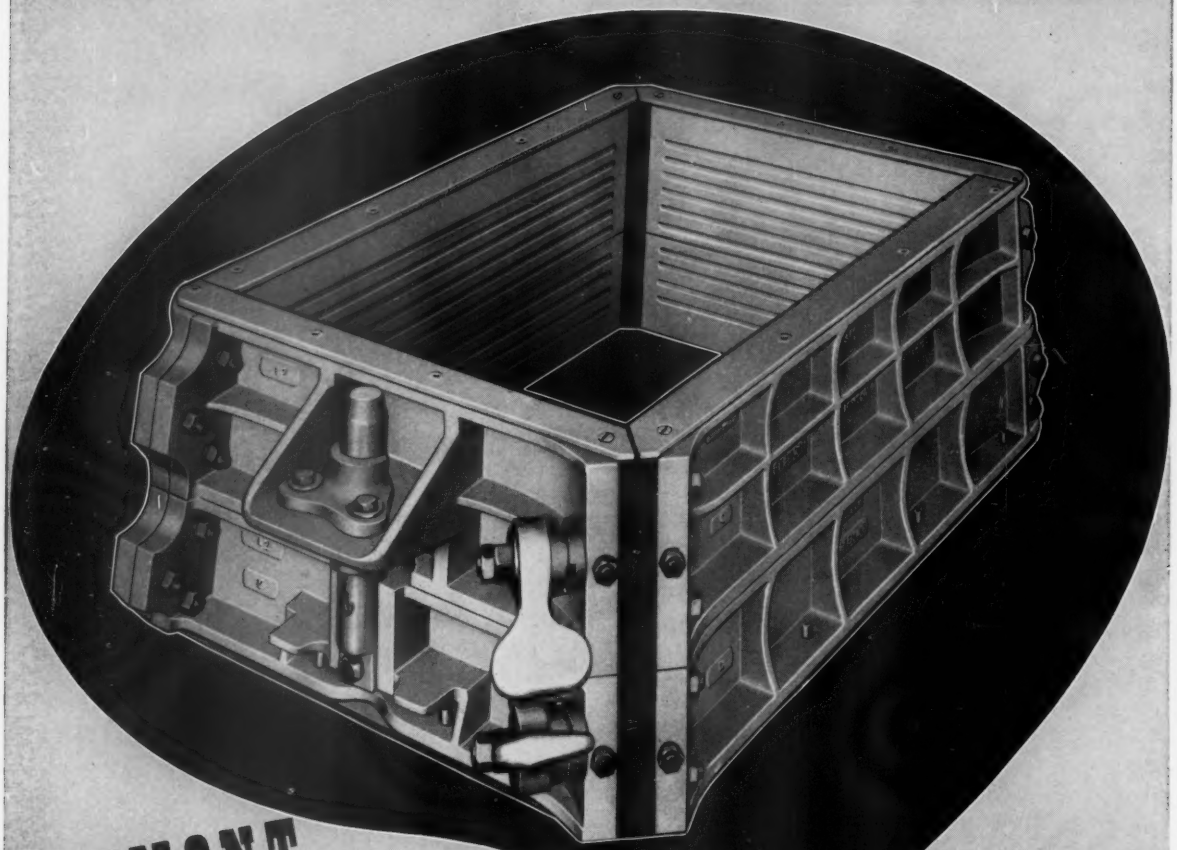
(PD) POSITIVE DUPLICATION

CINCINNATI° *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Trade Mark Reg. U.S. Pat. Off.

There's a world of difference in flasks!



FREMONT MAGNESIUM SPREADLOCK FLASKS

SAND CANNOT LODGE IN CORNERS

Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps.

LONGER SERVICE

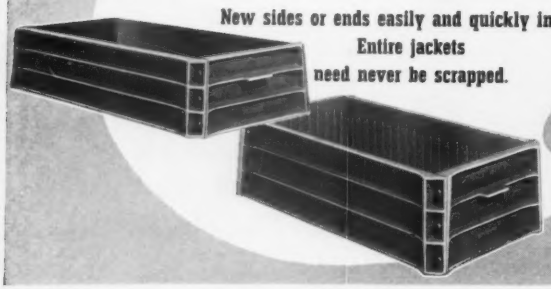
New two-piece male and female stop, inserted above and below the stud bolt, results in tremendous corner strength. Hardened forged steel cams.

LIGHTER, EASIER HANDLING

Write today for free literature and prices.

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

New sides or ends easily and quickly inserted. Entire jackets need never be scrapped.



The Fremont FLASK Co.
FREMONT, OHIO

ajax technical service

helps you get the most out of induction heating & melting

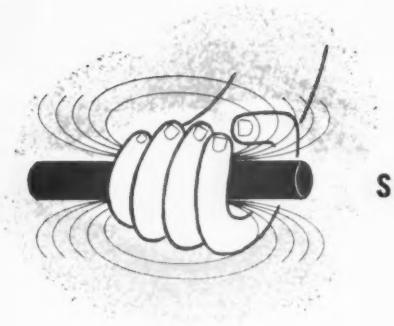
Induction heating & melting

AJAX

NORTHRUP

THE ONLY COMPANY OFFERING 41 YEARS OF INDUCTION EXPERIENCE

Circle 567 on Inquiry Card—Page 51



some straight talk on AJAX technical service

When you come right down to it, "technical service" is mainly a question of *experience* . . . the service is only as good as the experience behind it and the willingness of the manufacturer to share this experience.

Ajax has the savvy, will share

It almost embarrasses us to talk about experience in the field of induction heating & melting. *Ajax firsts* read like a history of induction technology—because they are!

The *first* high frequency induction furnace was fathered by our company some 41 years ago. As early as 1920, Ajax was supplying *vacuum* furnaces to National Bureau of Standards and others. Practically every new alloy developed since that time had its origin in an Ajax-Northrup induction furnace. These Ajax firsts go on and on . . . from melting, forging, surface hardening, vacuum melting . . . to making, sintering, and hot pressing carbides, graphitizing, uranium melting, and countless other low, dual, and high frequency applications.

These are the proofs of what Ajax Technical Service can do . . . pointing to what it can do for you and your company. Sharing this experience helps you, helps us.

Service a la carte

Now, no user or potential user of induction equipment wants or needs *all* our experience, even if it were possible to give. The practical sharing of our experience amounts to matching what we know about induction technology to *what you want to know about it*. This can vary quite a bit from job to job.

If, for example, you're considering induction heating & melting for the first time, you'll want to know a great deal about its basic advantages and how it compares in cost and performance with your present equipment.

Or suppose, on the other hand, you already have induction equipment and would like to improve its efficiency and decrease maintenance cost. Perhaps in this case Ajax can supply some pertinent test data on optimum temperatures and pour schedules, or some valuable tips on refractory ramming techniques that will save many hours in furnace maintenance.

Regardless of the type of engineering service you require in the field of induction heating & melting—whether it be general or specific, basic or advanced —Ajax is ready with savvy, will share! Ajax service engineers will be glad to analyze your heating and melting problems and make detailed recommendations. If induction is the answer to your problems, they will help you select the type of equipment best suited to your specific application . . . help you operate this equipment to obtain highest performance, maximum production . . . design new equipment if necessary.

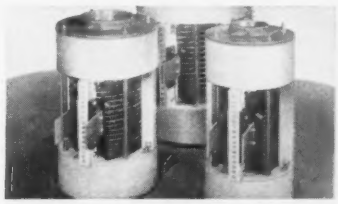
you can look to AJAX for progress in induction heating & melting

Ajax technical service helps put induction heating & melting to work

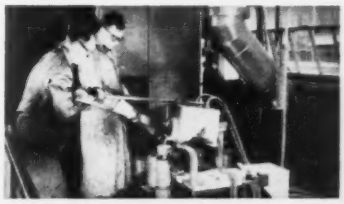
Listed below are a number of examples illustrating the length and breadth of Ajax experience in specific areas of induction heating & melting. Our direct experience in these and other areas may bring real dollars and cents savings to your operation. It's worth investigating! To start the flow of valuable induction heating & melting ideas in your direction . . . to get the most out of your induction equipment—just call or write Engineering Department, Ajax Electrothermic Corporation, Trenton 5, New Jersey.

in research and development

melting uranium for Atomic Energy Commission
During the earliest years of our nation's atomic energy program, substantially all uranium used was melted by high frequency induction heat in specially designed Ajax-Northrup furnaces.

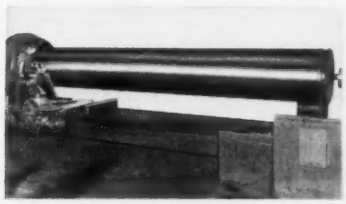


research in high temperatures
Ajax-Northrup high temperature furnaces are especially designed to provide fast, efficient heat at temperatures from 1200°C to 2000°C and above.

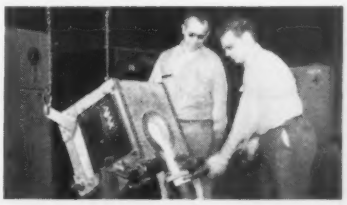


developing new alloys and alloying techniques
Many of the country's largest laboratories use Ajax-Northrup induction furnaces in studies of new alloys and for pilot-plant operation prior to large scale production.

in production

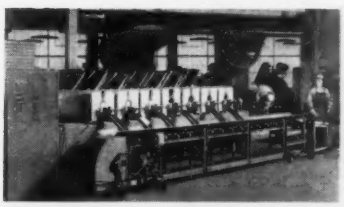


casting world's largest stainless steel centrifugal castings
At Sandusky Foundry and Machine Co., Ajax furnaces of up to 5 tons capacity melt metal for centrifugal castings weighing up to 20 tons.

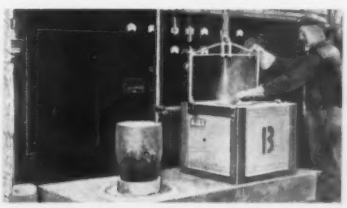


improving operation of investment casting foundry
Precision Metalsmiths, Inc., finds Ajax-Northrup furnaces ideal for melting some 92 different ferrous and nonferrous alloys. They give fast heat, produce alloys of the highest purity.

melting and pouring six tons of metal every 2½ hours
This Ajax-Northrup induction furnace turns out a six-ton charge of nickel alloy—precisely alloyed and virtually free of impurities—every 2½ hours. Speed of melting and electromagnetic stirring insure perfect alloys every time.



mechanizing giant forge shop
Imaginative forge design, plus the inherent flexibility of Ajax induction heating, make it possible to operate giant Massey-Harris-Ferguson forge shop with just three induction units . . . each equipped with seven heating fixtures.



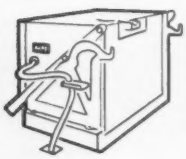
saving $33.00 per ton in nonferrous foundry
Ajax-Northrup furnaces produce big savings for City Pattern Foundry & Machine Co., Detroit. With nonferrous alloys, savings of over $33.00 a ton are reported in reduced metal losses, labor, and refractory.

vacuum melting in ever increasing capacities
The photo illustrates the first 1000-lb. vacuum furnace Inductiovac© which is now in production at the research and development center of Universal-Cyclops Steel Corp., General Offices, Bridgeville, Pa. This furnace incorporates Ajax-Northrup induction furnace and controls.

Circle 567 on Inquiry Card—Page 51

see them at the show new AJAX designs and improvements

Though far from "revolutionary," these new designs and improvements will bring considerable handling ease and increased productivity to present day induction equipment. Exactly how these Ajax innovations will help you in your specific application can be best discussed with our engineers at the show.

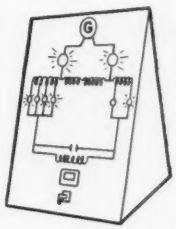


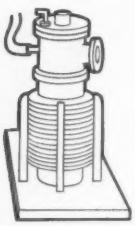
new type of co-ax leads

An Ajax-Northrup 300# furnace will be equipped with new type of co-ax side mounted leads that are being studied by our engineering staff.

operating switch exhibits

Here are two exhibits you can "work" yourself. One powercontrol shows how the Ajax tap switch operates. The other demonstrates the exclusive Ajax rotary capacitor switch, designed for exceptionally fine power factor control.



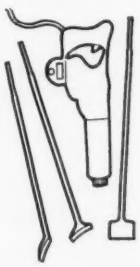


new vacuum furnace top

One of our stationary cylindrical vacuum furnaces will be fitted with a newly designed vacuum top.

induction furnace ramming tools

Developed and proved at Ajax's own manufacturing plant, these ramming tools will improve the life of furnace linings. You'll want to look them over carefully . . . operate them . . . learn how to improve your ramming techniques.

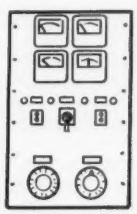


space-saving vertical motor-generator

Visitors to the Ajax booth will also see a totally enclosed, water-cooled, vertical motor-generator rated at 100 KW, 3000 cycles.

improved safety features

Operating display demonstrates improved type of molten-metal leak and ground detector.



SEE YOU AT BOOTH 1406 . . . BE SURE TO STOP IN . . . YOU'LL LIKE THE COMPANY

Induction heating & melting

AJAX

NORTHRUP

Special Literature Offer

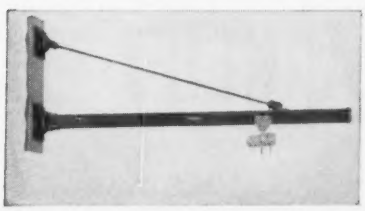
At the show Ajax will be offering an impressive collection of valuable and useful information in practically every phase of induction technology. Be sure to look this collection over carefully . . . choose the bulletins, booklets, and articles that will help *you* get the most out of induction heating & melting.

AJAX ELECTROTHERMIC CORPORATION, Trenton 5, New Jersey

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY—AJAX ENGINEERING CORPORATION

Reduce handling costs with . . . R-W CRANE and "TRU-TRED" MONORAIL SYSTEMS

Modern foundries have found that they can now efficiently and safely cut costs, and speed-up production by installing R-W Cranes and Monorail Conveyor systems. Whether you need a single unit for a specific operation or a complete system, R-W Cranes and Monorail Conveyors combine ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. R-W Cranes and Monorail systems are available in a size to efficiently and economically meet your specific requirements.



R-W 939 Swinging Jib Crane . . . available in a wide variety of sizes and capacities up to 4000 lbs. . . . Furnished with rod support. R-W 968 Jib Crane has curved track to support the outer end of boom.

R-W 971 Flexible Traveling Crane . . . self adjusting yoke and cross head . . . will not bind as bridge need not maintain right angles to tracks. Available in variety of sizes and capacities up to 8000 lbs. Not applicable as a transfer crane.

Why not let an R-W Sales-Engineer show you, without cost or obligation, how R-W equipment can effect remarkable savings for you in time, money and maintenance. Write today for complete information.

Richards-Wilcox
MANUFACTURING COMPANY
"MATERIAL HANDLING DIVISION"

466 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

Circle 569 on Inquiry Card—Page 51

The accelerated pace of business and industry reflected in the ever-changing New York skyline is a fitting backdrop for the accelerated pace and performance of the new *Clarklift*.

HERE'S WHAT NEW YORK CITY USERS THINK OF THE NEW CLARKLIFT

New York is a city where the worlds "newest, largest, tallest, greatest" are heard more often about a greater variety of subjects than any other single place on the face of the earth. This bustling metropolis, seemingly in a perpetual state of rebuilding or remodeling itself, is hungry for new ideas, new equipment that will keep pace with the ever increasing tempo of its business and industrial activity.

A product that does not meet these demands will not survive. A product that does will be received with open arms. This has been the case with the new *Clarklift*.

This new *Clarklift* deserves its description by the typical New Yorker as "the greatest". A completely new design in lift trucks, it incorporates features that were once thought impossible to build into such equipment. No-clutch driving, for instance, or a shorter turning radius. Lifting speeds are much faster. A single lever controls all lift and tilt action. Much has been done to improve driver comfort.

These are only a few in a long list of outstanding developments built into the new *Clarklift*. Why not ask for a competitive test at your convenience? Your Clark dealer will be glad to cooperate. He's listed in the Yellow Pages.

CLARK® EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

CLARKLIFT is a trademark of Clark Equipment Company

(Advertisement)

ELM COATED FABRICS CO., INC.—One of the largest producers of vinyl plastic fabrics, quality control and cleanliness are of prime importance. "We even translate quality to the type of equipment we purchase," says Robert G. Heller, production superintendent, "and we're sure there's nothing better than this new *Clarklift*."

AMERICAN AIRLINES—Meet Herb Gussow, Foreman of Automotive Services. "We know we can depend on equipment that bears the Clark name," says Mr. Gussow. "This new *Clarklift* is by far the most serviceable truck available. That's why we chose it."

INTERNATIONAL TERMINAL OPERATING COMPANY—This is the largest contracting stevedore and terminal operator in North America. Port Newark Manager Nick Montanino likes "the speed of operation of this new *Clarklift*. Our superintendents, drivers, and mechanics like the improved performance and accessibility for repairs of this truck."

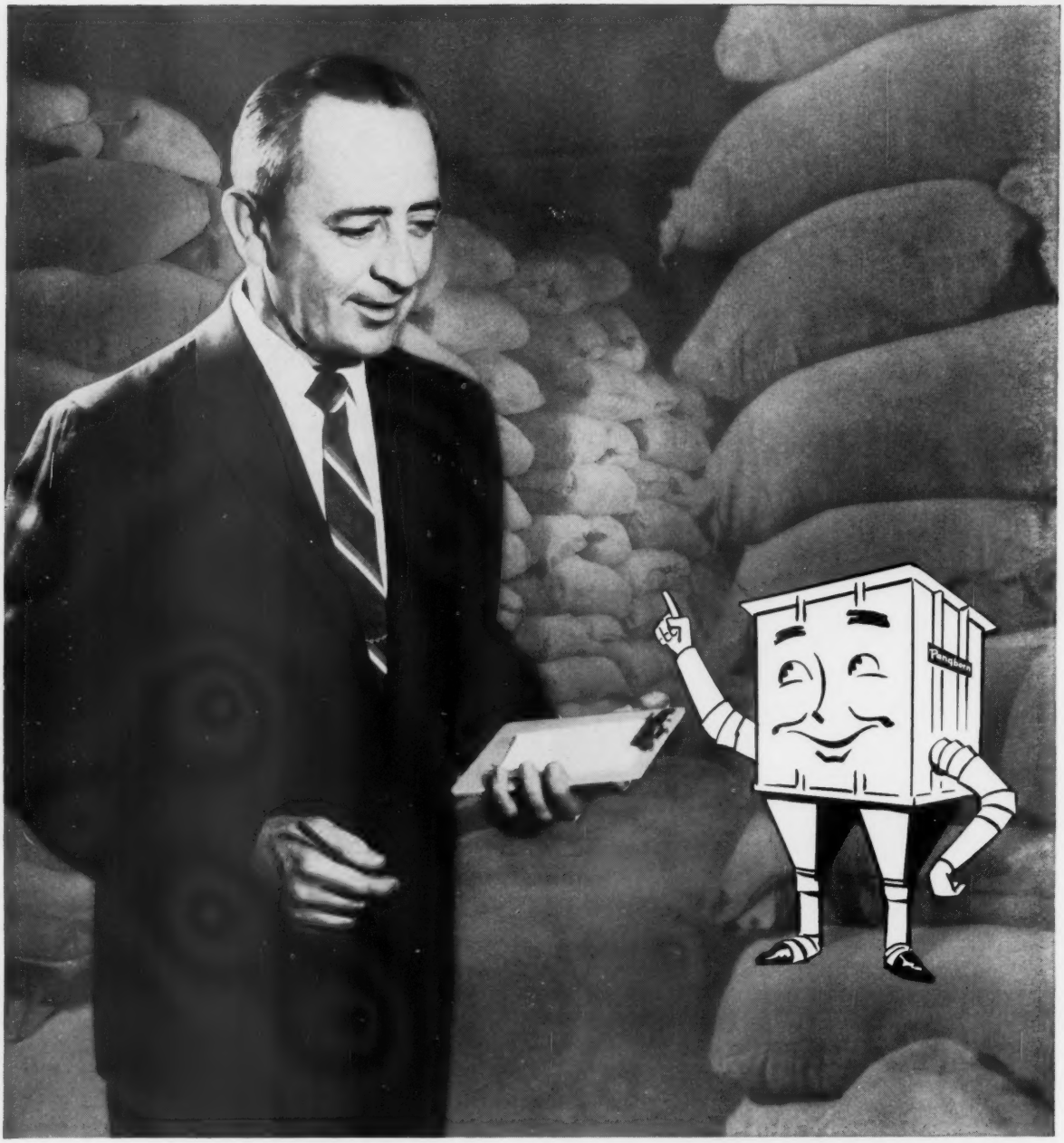
KRASDALE FOODS—Over two and a half million pounds of food a week are handled in one of the largest wholesale grocery warehouses in New York. Charles Krasne, Vice President, reports there are many features he likes in his new *Clarklift*. Moreover, "it is less expensive to operate."

CONVER STEEL AND WIRE COMPANY—"The drivers like the easy handling of the *Clarklift* . . . simplified controls are responsible," says David Connelly, Plant Manager. "And the no-clutch automatic transmission saves a lot of wear and tear on the truck too."

SEARS ROEBUCK & COMPANY—There's more than 100,000 square feet of space in this big Sears warehouse. Shipments are fast and furious. No wonder warehouse manager, George Sheehan thinks a lot of his new *Clarklift*. He says, "It's the easiest handling truck yet . . . and that gets the work out faster."

Circle 570 on Inquiry Card—Page 51

(Advertisement)



"You mean $15,000 a year salvaging dust?"

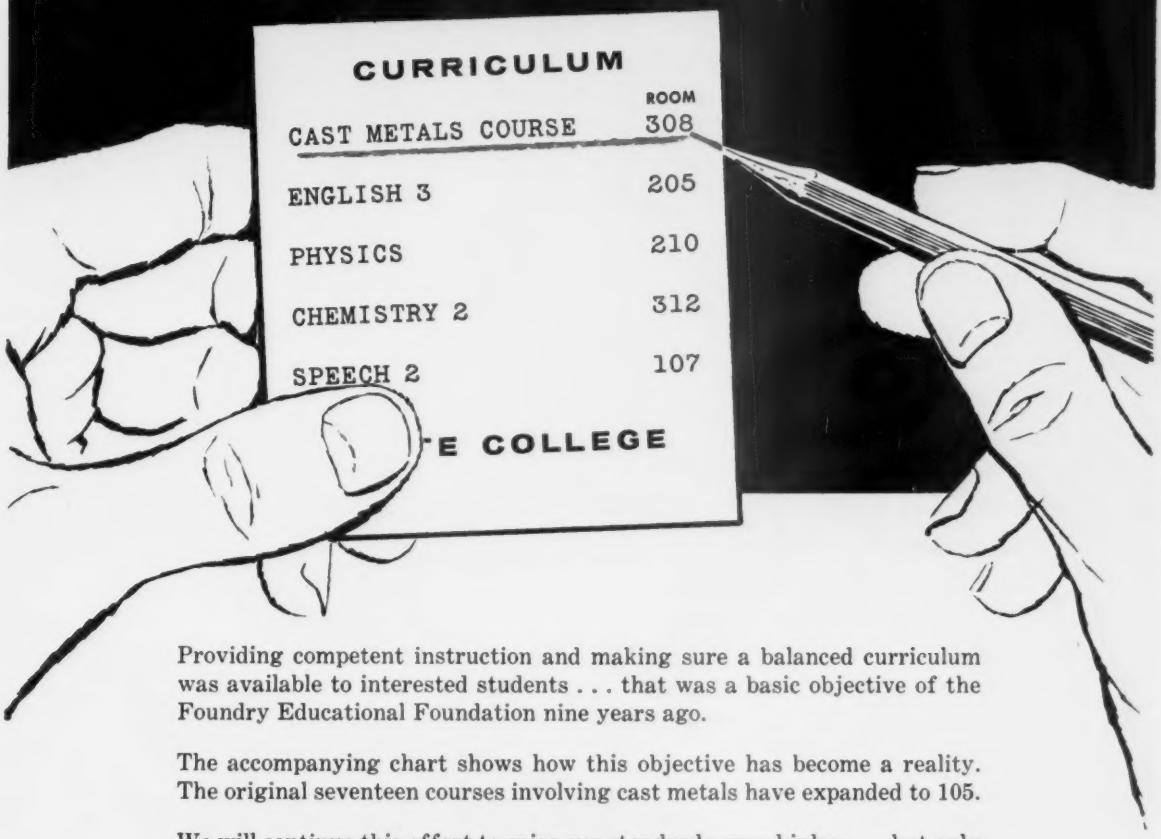
That's just what we mean! Many of our customers are clearing $15,000 a year and more from valuable material reclaimed by Pangborn Dust Control. Efficient Pangborn Dust Collectors trap dust at the source, gather it ready for resale, re-use or disposal. As a matter of fact, users of Pangborn Dust Control have made $20,000, $36,000, even $75,000 a year in salvaged dust, depending on the value of the dust collected.

What's more, Pangborn gives you other benefits of lower housekeeping costs, longer machinery life, higher employee efficiency and better employee and community relations. And Pangborn offers a complete line of collectors for all jobs.

Why not discover how you can profit from Pangborn Dust Control? Write for Bulletin 922 to PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control & Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

IT'S UP TO YOU!



Providing competent instruction and making sure a balanced curriculum was available to interested students . . . that was a basic objective of the Foundry Educational Foundation nine years ago.

The accompanying chart shows how this objective has become a reality. The original seventeen courses involving cast metals have expanded to 105.

We will continue this effort to raise our standards even higher . . . but only through **you** can this be accomplished. Your interest and encouragement and specific dollar support are needed. It's up to **you.**

FOUNDRY COURSES AVAILABLE

17 **1947**

105 **1956**

To learn more about F.E.F. and its endeavors to help you to help the castings industry, write for our new booklet, "Let's Look Ahead".

You'll be glad you did.

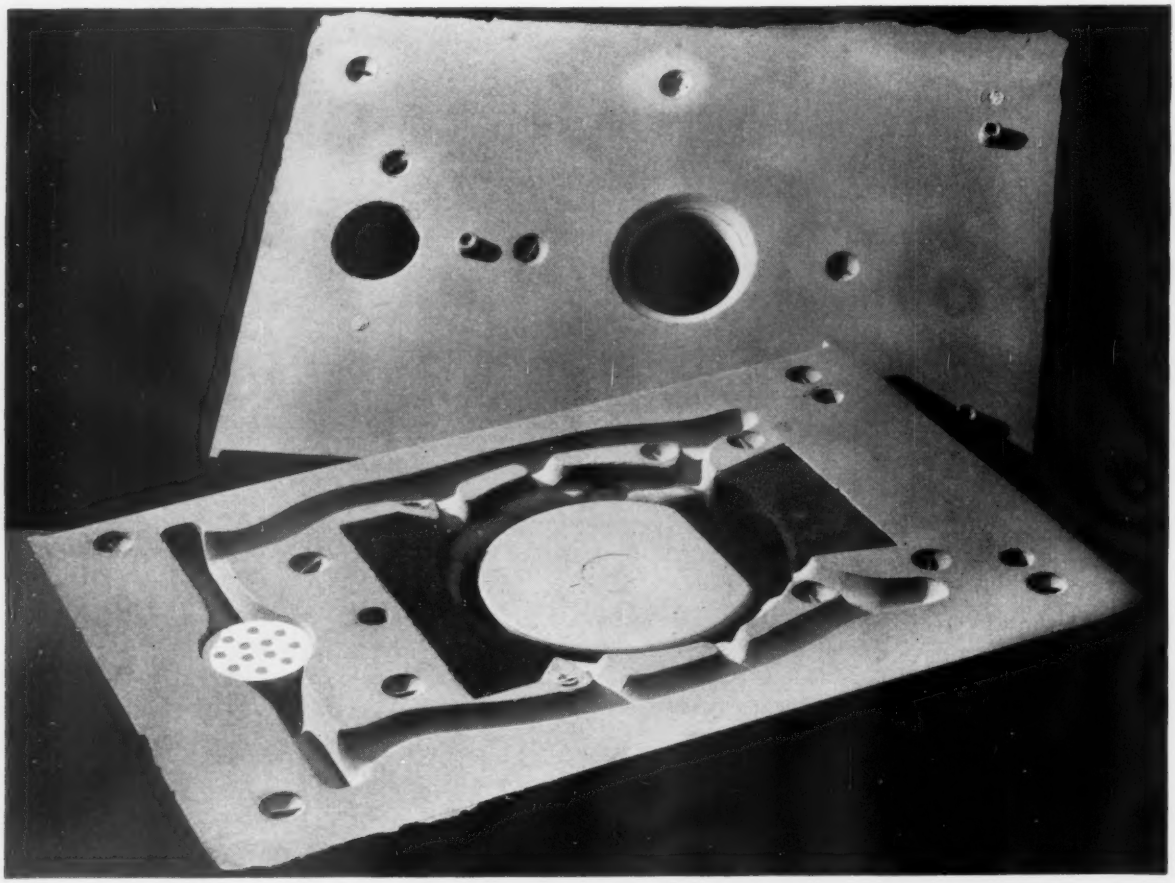
Foundry Educational Foundation

1138 TERMINAL TOWER BUILDING • CLEVELAND 13, OHIO

The Foundry Educational Foundation does not pay for this advertising. This space has been contributed by FOUNDRY magazine in support of FEF's constructive program for foundry industry progress through education.

DRY MIX OR COATED
DUMPED OR BLOWN
HOT OR COLD

for the **finest** in shells and cores



DUREZ RESINS are matched to your methods

Top Savings . . . of labor, of time, of materials—are achieved in shell mold and core production where the resin is matched to the method and equipment employed. Each technique imposes different resin requirements from the others.

Durez Resins . . . perfected by working directly with foundries—can help you make sure of optimum results, whichever methods you use. For each process there is a Durez phenolic resin that produces shells or cores of consistently high strength and uniform density. To get remarkable detail and freedom from rejects, why not try the one formulated for your procedure?

Write for a trial shipment and technical data.

FOR DRY MIX SHELL MOLDS – *Durez 18123,* a fast-curing resin of superior hot and cold strength. Permits most economical sand-to-resin ratios.

FOR COLD COATING SAND – *Durez 18250,* a powdered phenolic designed for producing shells or cores, either dumped or blown. Its excellent strength makes thinner molds practical.

FOR COLD COATING WITH LIQUID RESIN – *Durez 18115,* liquid resin and 18117 accelerator in some cases are preferred to the powdered resin.

DUREZ®

Phenolic Resins that Fit the Job

DUREZ PLASTICS DIVISION

HOOKER CHEMICALS PLASTICS

HOOKER ELECTROCHEMICAL COMPANY

1010 WALCK ROAD, NORTH TONAWANDA, N. Y.

Export Agent: Omni Products Corp., 460 Fourth Avenue, New York 16, New York

WHEN ONE-HALF OF THE BOXCAR IS EMPTY... THE TL-6 TURNS AROUND INSIDE THE CAR AND UNLOADS THE OTHER HALF

Compact TL-6 TRACTOLOADER® keeps material moving for CHENOA MILLING COMPANY, Chenoa, Illinois

Since there isn't a ramp at Chenoa Milling Company's warehouse (due to railroad restrictions), the TL-6 enters the boxcar containing grain about 200 yards away — where there is a ramp. Car is then moved to warehouse. Here a makeshift bin is fed by the TL-6 and the grain moves into the warehouse on a conveyor. The boxcar stays at the warehouse until it's completely unloaded — no need to move it back to the ramp when half unloaded. The TL-6, with its compact design and short turning radius, easily maneuvers around inside the car to finish its job.

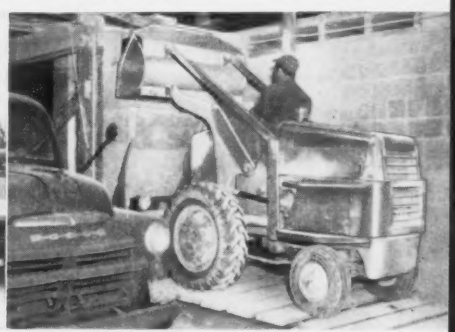
Why not let this ½-yd loader solve your confined-area material handling problems? Get an on-the-job demonstration from your Allis-Chalmers construction machinery dealer.

TRACTO — *a sure sign of modern design*

TL-6 QUICKLY HANDLES OTHER JOBS FOR CHENOA MILLING, TOO!

CARRIES FERTILIZER FROM BOXCAR INTO STORAGE SHED — no losing the load, either, with tip-back bucket. Makes complete cycle without shifting — operator just pushes or pulls a lever to go forward or reverse.

DELIVERS FERTILIZER TO CUSTOMER'S TRUCK — a full bucket every time. TL-6 gets load without ramming with smooth crowding action of hydraulic torque converter drive.



LOADS HOPPER WHEN MIXED FERTILIZER IS ORDERED—elevator transports it to mixer. TL-6 makes hairpin turns into and out of the various bins for the different kinds of fertilizer.

SOLD AND SERVICED BY YOUR ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER

Send For Free Descriptive Catalog On The Complete Line Of Tracto-Loaders

TRACTOMOTIVE

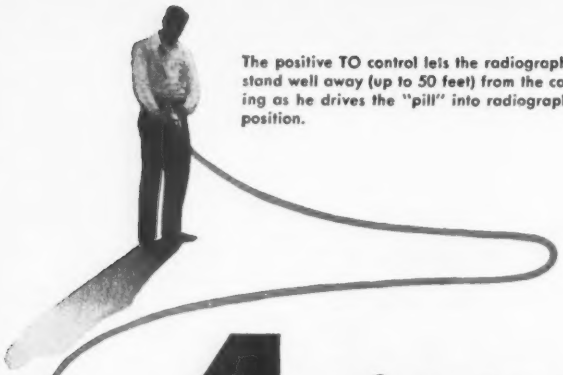
TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

Circle 574 on Inquiry Card—Page 51

TRACTOMOTIVE CORPORATION, Dept. F
Deerfield, Illinois

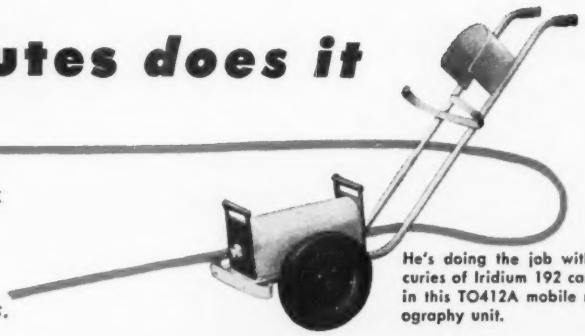
☐ Please arrange a demonstration of the TL-6
☐ Send catalog on Tracto-Loaders

Name .....
Title .....
Company .....
Address .....
City ..... State .....



The positive TO control lets the radiographer stand well away (up to 50 feet) from the casting as he drives the "pill" into radiographic position.

4 minutes *does it*



He's doing the job with 50 curies of Iridium 192 carried in this TO412A mobile radiography unit.

The man up there radiographing that 2" thick steel casting down there will have the job done in four minutes.

That's how fast modern gamma radiography is.

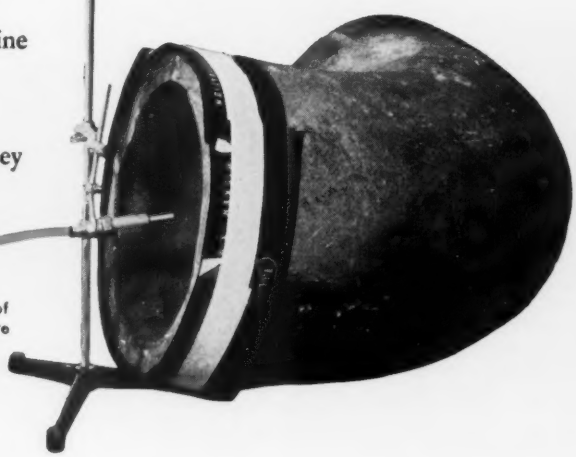
The isotope he's using (Iridium 192) will give him 2% sensitivity, too. Matter of fact, you can easily get 2% sensitivity in sections up to 6" of steel, brass, copper, bronze . . . even *lead* . . . when you match the isotope to the job.

Makes no difference what you *make* or *buy* or *sell* (plastics, light metals, fabricated parts, assemblies—the list is endless) if it needs radiographic "seeing into" for quality control, we have the machine (gamma or x-ray) to do it most efficiently.

If *you are* confronted by an inspection problem why not let our consulting radiographers see what they can do for you? It will cost you nothing, may save you a lot. Call your local Picker* representative or write us outlining the situation.

Picker x-ray

25 South Broadway, White Plains, N. Y.



One "shot" radiographs the entire girth of the casting. Picker Flexible Film Holders are quickly taped on, quickly removed.

**There's probably a Picker district office near you (see your local 'phone book).*

PICKER... one stop for everything in industrial fluoroscopy and radiography

ANDREX lightweight portable x-ray units—130 KV, 160 KV, 200 KV, 260 KV and *Androscope* X-ray Stress Analyzer.

PICKER x-ray units—5 to 50 KV, 150 KV (stationary and mobile), 270 KV portable, 260 KV heavy-duty, x-ray diffraction apparatus, rayproof inspection cabinets.

ACCESSORIES . . . films, tanks, darkroom sundries, illuminators, *everything.*

TECHNICAL OPERATIONS units for isotope radiography—sources, equipment, containers for Iridium ^{192} Cesium ^{137} Cobalt ^{60} and Thulium ^{170}.

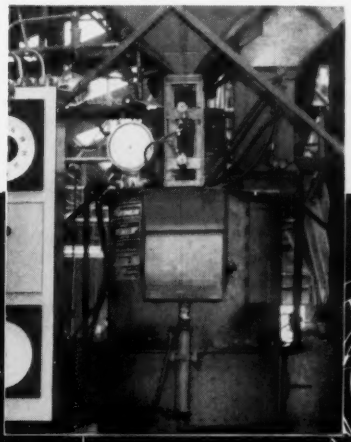
No. 1 in a Series: "Helping the Small Foundry Stay in Business"

LIQUIDATION OR MECHANIZATION?

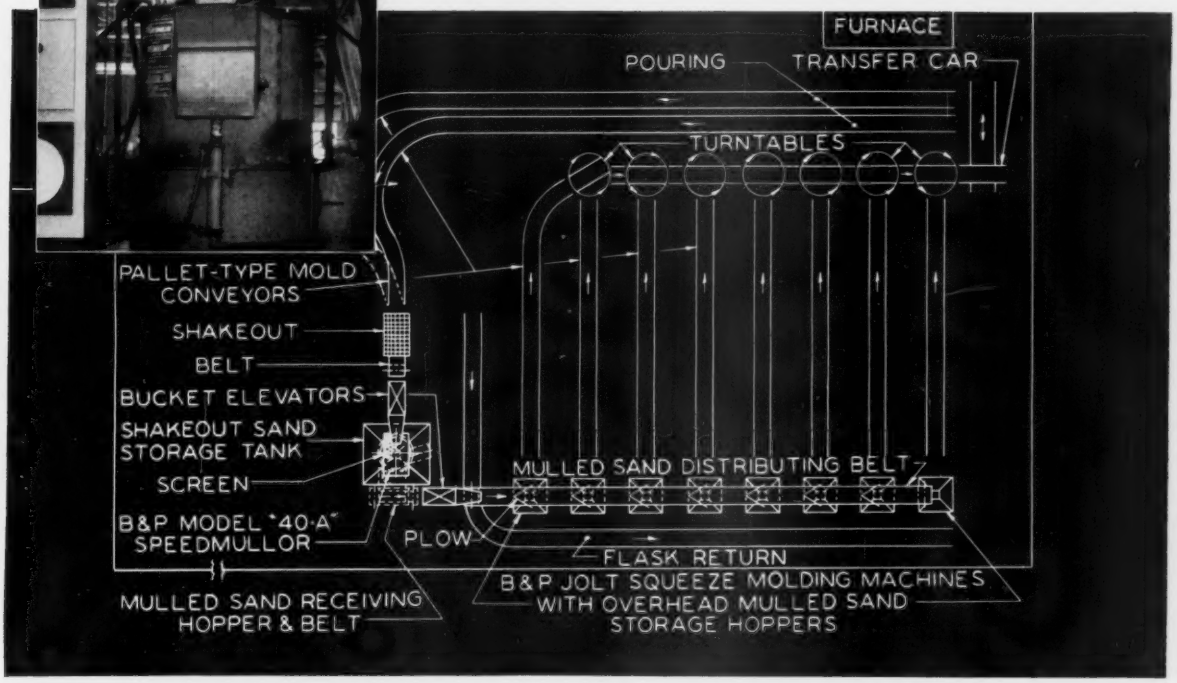
The Worth Manufacturing Company of Fort Worth, Texas, grew fast, but its problems grew too. Started in 1950 with only three men, this aluminum foundry had 55 employees working three full shifts by 1955. Production was up to 600 molds per day, but poor sand control and unmechanized operation were causing real trouble — nearly $200 worth of castings were being scrapped daily. The foundry faced a crisis . . . to mechanize or go out of business.

Liquidation was out of the question for this fighting outfit. A '40A' Speedmullor with Speedmullor Cooling, Mulltrol-matic Controls, and automatic moisture controls was installed to provide a quality-controlled, cost-controlled sand practice. B&P Jolt Squeezers were installed to boost molding production, and a Mulbaro was put on the core sand preparation job.

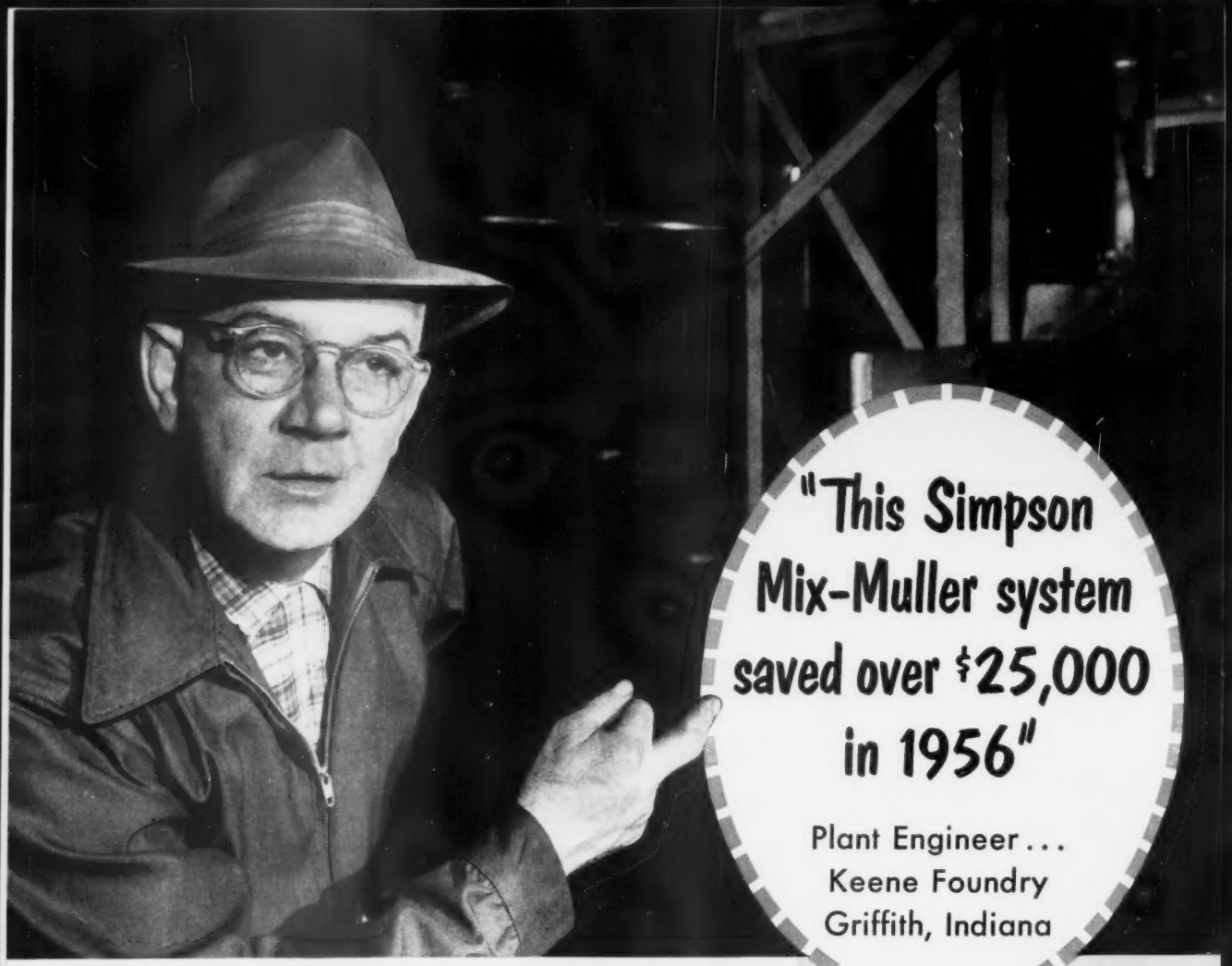
With the help of B&P engineers, the cost of mechanization was held to a low figure . . . in fact, the equipment paid for itself in little more than a year of operation. The results . . . here they are . . . three shift operation cut to single shift . . . 55 man work force cut to 33 . . . individual molder production up from 60 - 90 to 200 - 300 molds per day . . . total mold production up from 600 to 2000 daily . . . scrap losses now negligible.



A Small Production Foundry Finds Lower Costs With B & P Speedmullor and Molding Machines are Key to its Survival.



Worth's story featured in October BETTER METHODS is yours for the asking . . . write today. Beardsley & Piper, Div. Pettibone Mulliken Corporation, 2424 N. Cicero Ave., Chicago 39, Illinois.



"This Simpson Mix-Muller system saved over $25,000 in 1956"

Plant Engineer . . .
Keene Foundry
Griffith, Indiana

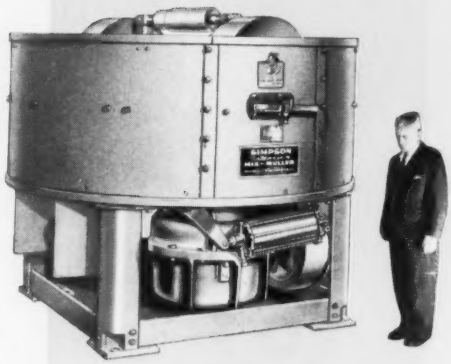
How National Utility Unit is paying *its own way* with more and better castings at lower cost

In August 1955 Keene Foundry Company of Griffith, Indiana mechanized their sand preparation and shakeout department with the National-Engineered and fabricated unit shown in the photos at right.

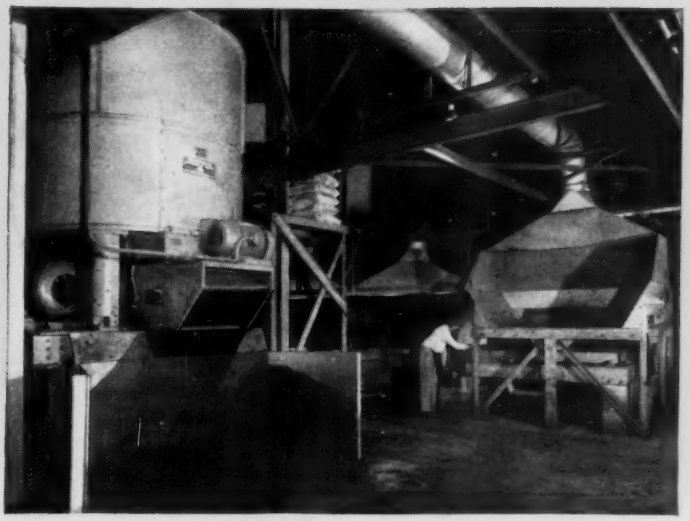
About 10 months after the unit had been erected, tested and put into operation we asked Keene Foundry to comment on the performance of their new sand preparing and handling plant. Some of their observations, as phrased by the plant engineer, are recorded at right.

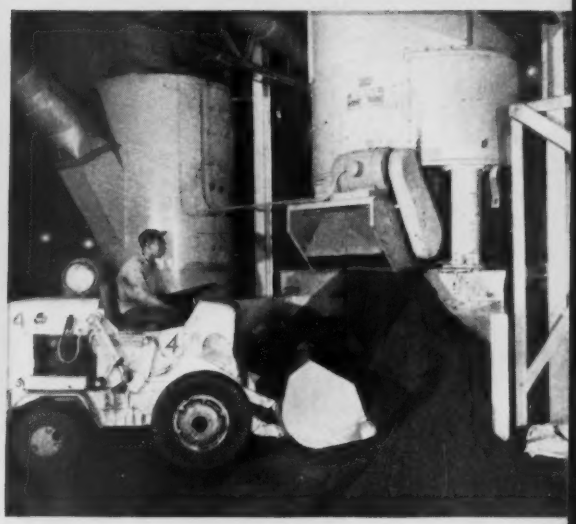
To National they represent a little more than praise for a well-engineered job. They stand as convincing evidence of the *profit packed* efficiency which small and medium sized foundries can realize through even limited mechanization—with the National Utility unit.

Read how Keene Foundry saved over $25,000 in 1956 and remember that *at* NATIONAL . . . foundry engineering and the proper integration of foundry mixing equipment *is our business.* It has been, for over 40 years.



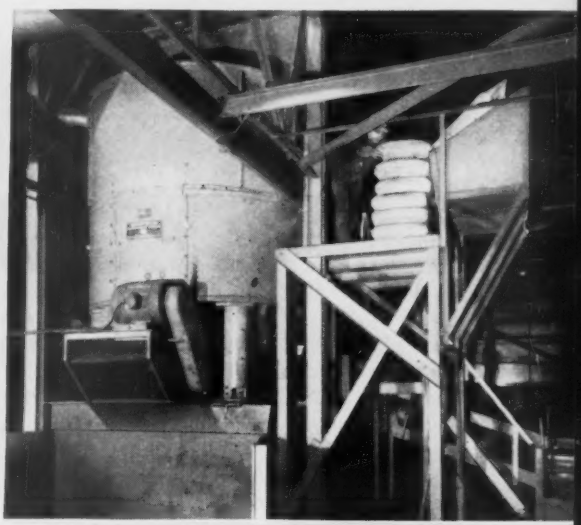
A No. 3F Simpson MIX-MULLER turns out 5200 lbs. of sand per batch for Keene Foundry's new sand preparing plant.





"We save $5.40 per ton of castings... Installation of the Simpson Mix-Muller and National Utility unit has put our shakeout and sand conditioning department on a *production line* basis. We figured on saving about $16,000 the first year, but, on a production of 6,300 tons of 1½ oz. to 100 lbs. grey iron castings our savings during '56 were closer to $25,000. Three years should amortize the cost of the Utility unit."

"Proper sand control is one of the most important factors in maintaining our finished casting quality. Since we require very accurate Brinell hardness control on all of our castings, moisture control is a critical factor. We have now reduced sand reconditioning operations to an almost mathematically controlled process . . . This would not have been possible without the quality of sand produced by the Simpson Mix-Muller."



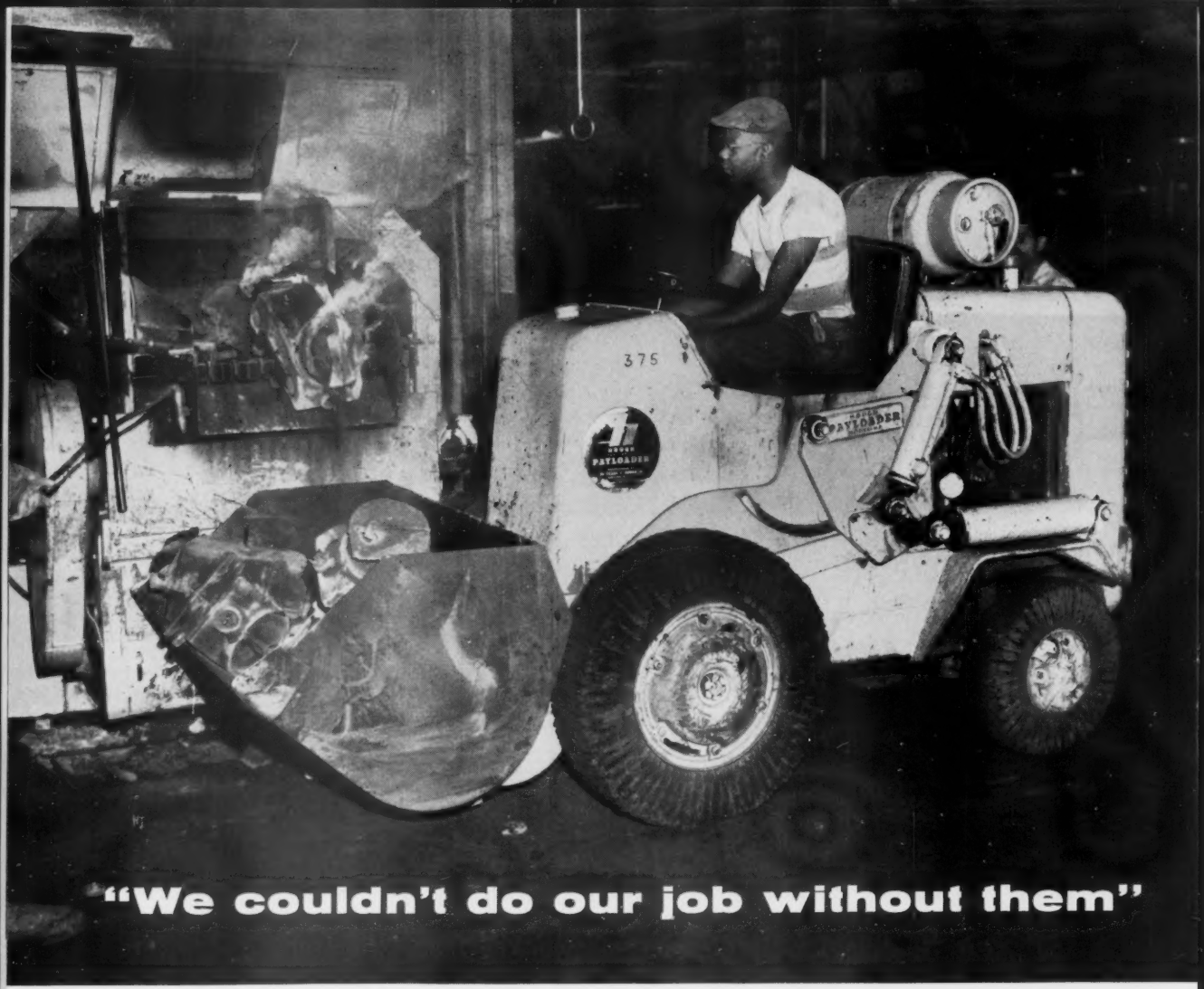
"Working conditions have been improved by 100%. Manual removal of castings is practically eliminated. With the Utility unit we clean a 500-ft. long foundry floor of molds and castings in about three hours. This job formerly took an entire eight hour shift. The operation is not only quicker but we use half the number of men to do it . . . and we feel that the working conditions involved have been improved by 100%."

"The three years amortization of this Mix-Muller system is a small price to pay for the advantages of greater quality control, improved working conditions, better quality sand and more rapid sand conditioning operations."

WRITE FOR UTILITY UNIT BULLETIN

NATIONAL ENGINEERING COMPANY

646 Machinery Hall Bldg., Chicago, Ill.



Robert Shea, Crouse-Hinds' foundry engineer says, *"This type of shakeout operation could not be carried out without the services of the 'PAYLOADER' units. Due to the versatility and ruggedness of the 'PAYLOADER' tractor-shovels we were able to install molding systems which increased production 30% and substantially reduced risks of injuries from lifting and handling hot castings. We couldn't do our job without them."*

Crouse-Hinds Company, Syracuse, N.Y., is a foremost manufacturer of electrical equipment including conduit fittings, floodlights, airport lights and traffic signals. In its foundry, three model HA "PAYLOADER" tractor-shovels play an important part in an ingenious and efficient production line.

During the pouring operations, these versatile tractor-shovels stand by the end of the pouring-conveyor line. As fast as the jackets are removed, the molds are pushed from the conveyor into a "PAYLOADER" bucket and are carried and dumped on the shakeout. As the castings come off the end of the shakeout they drop into a waiting "PAYLOADER" bucket, as shown in the illustration, and are whisked away to the core-knockout room. These three model HA's also deliver sand from the mixer to the molding stations.

A variety of extra attachments are available to interchange quickly with its bucket and enable the model HA to do other useful jobs — tine bucket, lift fork, pick-up sweeper, castered scrap hoppers. A nearby Distributor is ready to demonstrate what a model HA or a larger "PAYLOADER" can do for you on *your* jobs.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

- ☐ Model HA (18 cu. ft.) and HAH (1 cu. yd.)
- ☐ Larger models up to 2¼ cu. yd.

Name _____

Title _____

Company _____

Street _____

City _____ State _____

78

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

IH

Circle 578 on Inquiry Card—Page 51

Late News

SCRAP OFF: Ferrous scrap is costing foundries less than it did a year ago. In representative centers such as Chicago, Cleveland, Philadelphia, and Pittsburgh, No. 1 cupola cast is quoted $6 to $9 a ton less than last year. Steel scrap prices are off even more; reductions include $9 to $14.50 a ton on No. 1 heavy melting steel, $8 to $14 on cut structurals and plates, and $11 to $13.50 on electric furnace bundles.

Pig iron, on the other hand, costs more than it did a year ago. The increase on No. 2 foundry and malleable grades has been $3.50 at most centers. Latest price change is an advance of 75 cents a ton to $78 on blast furnace silvery iron at the Jackson, Ohio, furnaces.

FARM EQUIPMENT SALES RISE: Business for the farm equipment industry during 1957 will average out distinctly better than 1956 levels, R. S. Stevenson, president, Allis-Chalmers Mfg. Co., Milwaukee, told members of the Farm Equipment Institute last week. He attributed the rise to an end of the seven-year drouth in the West and Southwest, the close of indecision brought on by the national elections last year, and the realization of farmers that modern power equipment is a profitable investment.

DIECASTERS ELECT: American Die Casting Institute, the national association of jobbing diecasters, re-elected incumbent officers at the annual meeting in Chicago, Sept. 17-20. They include Clifford J. Sheehan, Die Casting Div., Aluminum Co. of America, Garwood, N. J., president; Clifford L. Anthony, Hoover Co., North Canton, Ohio, vice president; and David Laine and W. J. Parker, ADCI, secretary and treasurer, respectively.

FOUNDRY EXPANSION: Allegheny Ludlum Steel Corp. is engaged in a $1 million expansion program at its foundry in Ferndale, Mich. Foundry area is being increased 75 per cent. New equipment to be added includes a sand-handling system and reclamation unit, sand-slinger, shakeout, and airless blast cleaning equipment. The program is expected to increase capacity 20 per cent.

PERSONALS: New appointments at Kaiser Aluminum & Chemical Sales Inc., Chicago, include G. F. Palmer, assistant general sales manager; M. C. Crockett, manager of industry sales, and S. P. Whiteside, assistant to the general sales manager . . . Charles E. Peterson, former chief metallurgist, Mackintosh-Hemphill Div., E. W. Bliss Co., Pittsburgh, has been made manager of manufacturing operations for the division . . . Stanley Marwin has been appointed assistant works manager of the Los Angeles plant, American Manganese Steel Div., American Brake Shoe Co., New York . . . Lawson Wile has been appointed foundry superintendent, Wysong & Miles Foundry Inc., Greensboro, N. C. . . . Harry S. Schweinsberg has been made assistant general manager, Harbison-Walker Refractories Co., Pittsburgh . . . Aluminum Co. of America, Pittsburgh, has named the following officers: I. W. Wilson, chairman of the board; Frank L. Magee, president, and Harold C. Erskine, vice president and general production manager . . . Johnstone Foundries Inc., Grove City, Pa., has elected George Johnstone III vice president. Other appointments include Charles L. Masson, foundry superintendent, and Harold Gassner, sales manager.

NEW CAR WHEEL PLANT: American Steel Foundries, Chicago, will construct and equip a second Canadian plant for the manufacture of cast steel wheels for railroad freight cars. To be built in Transcona, Man., it will be operated by Griffin Steel Foundries Ltd., St. Hyacinthe, Que., a subsidiary of ASF. Operations should begin late in 1958, and plant capacity will be about 100,000 wheels a year.

OBITUARY: Franklin R. Hoadley, retired president, Farrel-Birmingham Co., Ansonia, Conn., died Sept. 12 . . . William H. Mason, 58, general superintendent, Allyne-Ryan Foundry Co.,

Cleveland, died Sept. 9 . . . S. S. Hibbard, 57, chief engineer, Dobbie Foundry & Machine Co., Niagara Falls, N. Y., died Sept. 1 . . . Otis Hutchins, 68, former director of research, Carborundum Co., Niagara Falls, N. Y., died Aug. 27.

PRIMARY ALUMINUM: Production of primary aluminum, held to 92,406 tons by strikes in August, 1956, rose to 143,448 in the same month this year. The increase brought 1957 production through August to 1,110,773 tons, against 1,104,326 tons in the 1956 period.

STARTS DIECASTING: Ford Motor Co.'s aluminum castings plant at Sheffield, Ala., is in partial production, making diecast parts for automatic transmissions. The foundry is expected to produce 140 tons of aluminum parts for engines and automatic transmissions daily when it hits full production.

MORE FREIGHT CARS: Deliveries of new freight cars to railroads totaled 8758 in August, compared with 7725 in July and 5364 in August, 1956. Sept. 1 backlogs of carbuilders totaled 79,258, against 122,870 a year ago.

MISCELLANY: Columbia Steel Casting Co., Portland, Oreg., was gutted on the night of Sept. 2 by a four-alarm fire . . . Electrodos Nacionales, S. A., an affiliate of Union Carbide Corp., New York, is building a graphite electrode plant on a 200-acre site at Apodaca, Mexico, near Monterrey . . . Reynolds Metals Co. will build a $6 million research and office building in Richmond, Va., on a site adjacent to a $10 million building, now nearing completion, which will house the company's executive offices . . . Brost Foundry Co. is the new name of the former Brost Pattern & Casting Co., Cleveland . . . Bay State Abrasive Products Co., Westboro, Mass., has purchased 15 acres of land in Santa Cruz County, Calif., for a manufacturing plant and warehouse . . . Production of iron castings in the United Kingdom during the second quarter was 944,460 tons, against 1,022,040 tons a year ago . . . Blast furnace A at the Neville Island Works, Pittsburgh Coke & Chemical Co., was blown in Sept. 11 after complete relining, installation of new equipment, and adaptation to permit production of standard ferromanganese in addition to pig iron . . . Crown Brass Mfg. Co., Alhambra, Calif., has expanded facilities to diversify production.

Prices of Foundry Metals and Coke

(As of Sept. 23, 1957)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	67.00	67.50
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	67.00	67.50
Fontana, Calif.	74.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 27.75; tin bronze, No. 225, 37.00; No. 245, 33.50; high-leaded tin bronze, No. 305, 31.25; No. 1 yellow, No. 405, 22.50; manganese bronze, No. 421, 25.50.

ALUMINUM: 99 per cent plus primary ingots 28.10. Secondary No. 12 alloy, 22.25-23.00. Deoxidizing grades: No. 1, 23.75, No. 4, 19.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 27.00, delivered Connecticut valley.

ZINC: High grade 11.35 delivered. Die casting alloy No. 3, 14.25; No. 2, 15.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$46.00-47.00	**$54.00-55.00	.....	.....	.....	.....	$59.00-60.00
Boston*	**38.00-39.00	**33.00-34.00	.....	.....	**41.00-42.00	.....	.....
Buffalo	47.00-48.00	**46.00-47.00	.....	.....	**51.00-52.00	.....	66.00-67.00
Chicago	51.00-52.00	44.00-45.00	.....	49.00-50.00	49.00-50.00	58.00-59.00	66.00-68.00
Cincinnati*	**43.00-49.00	**43.00-44.00	**39.00-40.00	.....	**52.00-53.00	.....	**70.00-71.00
Cleveland	48.00-49.00	49.00-50.00	37.00-38.00	50.00-51.00	52.00-53.00	59.00-60.00	71.00-73.00
Detroit*	**43.00-44.00	**48.00	**43.00	**49.00	.....	**51.00	.....
Los Angeles	46.00	**52.00	.....	.....	.....	.....	.....
New York*	45.00-46.00	45.00-46.00	44.00-45.00	.....	.....	.....	.....
Philadelphia	45.50	46.00-47.00	50.50	.....	56.00-57.00	61.00	69.00-71.00
Pittsburgh	49.00-50.00	48.00-49.00	.....	.....	57.00-58.00	.....	71.00-73.00
St. Louis*	46.00	47.00	42.00	48.00	.....	.....	69.00
San Francisco	44.00	52.00	40.00	52.00	52.00	.....	.....
Seattle	42.00	38.00	35.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Whitehead's
FINE SILICA SANDS
for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

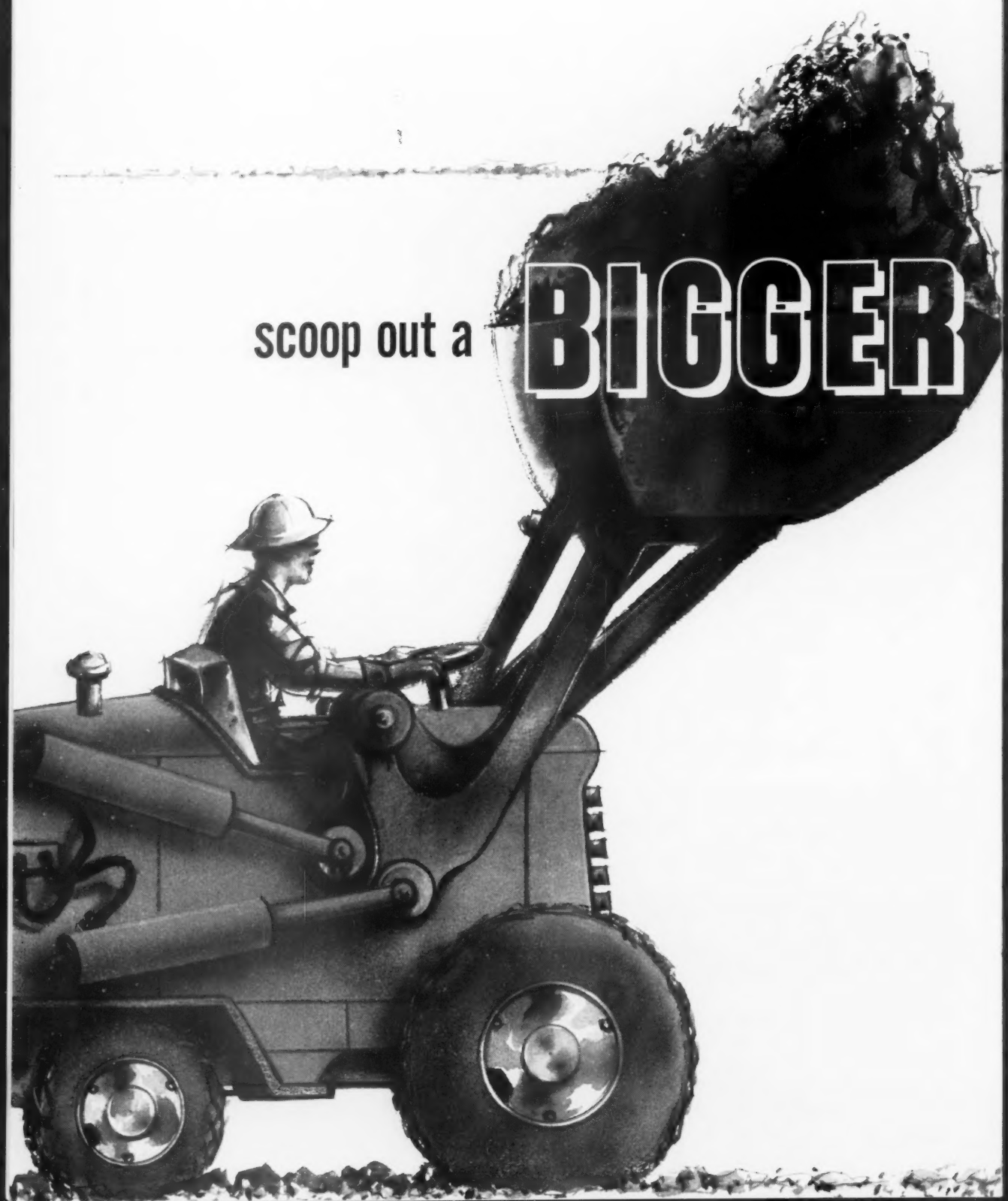
LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating


scoop out a BIGGER

share of this **FOUNDRY** market . . .

Now's the time to move forward!

Foundries spend more than $10½ million a day for equipment and supplies.

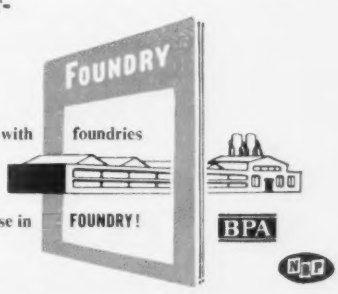
There's never been more potential for increased sales volume in this market. Extra sales have seldom been more promising than right now—because applying the needed effort is so simple.

You start with a *full* schedule in FOUNDRY—basic because in reaches every known buying influence in every foundry employing 20 or more and 96% of all others.

Our exclusive PLUS-5 Sales Development Service takes you straight to the heart of your market—person to person. You work with a complete advertising-sales package that does a selling job on foundries alone. Nothing sells foundries like FOUNDRY.

Your request will bring complete information promptly.

You do more business with foundries when you advertise in FOUNDRY!

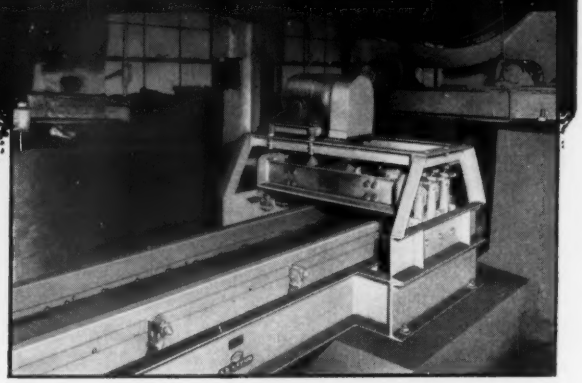


a PENTON Publication / Penton Building, Cleveland 13, Ohio

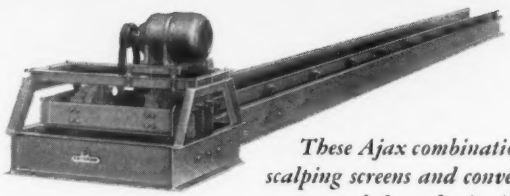
Circle 580 on Inquiry Card—Page 51

AJAX LO-VEYORS

CUT COSTS OF CONVEYING BULK MATERIALS



One of 60 Ajax Lo-Veyors installed under foundry floor removing sand from shake out stations in large automotive foundry.



These Ajax combination scalping screens and conveyors are used from beginning to end in progressive foundry processes.

● Ajax Lo-Veyors scale, size, separate and screen foundry sand, tramp iron and core wires in one operation while conveying... this saves time, space and manpower. Quick removal of foundry sand between progressive processes keeps high speed equipment running at top capacities.

Ajax self-contained Lo-Veyors made in a wide range of sizes and lengths from 3′ up are easily installed...the low head room required for pan and drive unit saves valuable production space in foundries...easily mounted on or under floors or suspended from walls and ceilings.

Dynamically balanced drive unit assures smooth operation of entire unit. Pan and drive unit designed for low power requirements and minimum anchorage. Bearings are splash lubricated and sealed in oiltight case for complete protection from abrasive conditions.

The open type pan has the advantages of simplicity and accessibility. It can be loaded at any point, or several points. The material is always open for inspection. Manually or mechanically operated gates can be provided to shunt material at any one of several points.

Ajax Lo-Veyors are being welcomed as cost saving successors to shovels, wheelbarrows and expensive non-productive labor by custom and high production foundries.

Write today for Ajax Lo-Veyor Bulletin 39

AJAX FLEXIBLE COUPLING CO. INC.

Representatives in Principal Cities

WESTFIELD, N. Y.

Better duck, Princess Wenatchee! Because it sure looks like "Old Pro" Chief Keokuk is seeing birdies instead of shooting them. Crafty Junior is back on green pastures with a nifty exhibition of blasting from a trap!

Trapped by rising costs and ways to control quality? Foundries and steel plants who are old pros at the game have paired up with Keokuk Silvery to break par day after day. They know Keokuk Silvery Pig Iron is the superior form of silicon introduction . . . that pig for pig, car for car, its dependable uniformity never varies! Handle by magnet, charge by weight or count the pigs for equal accuracy. Aluminum producers . . . you'll have a par-busting partner in Keokuk Silicon Metal. Try it!

KEOKUK ELECTRO-METALS COMPANY
Keokuk, Iowa
Wenatchee Division, Wenatchee, Washington

When you think of SILICON, think of KEOKUK!

KEOKUK SILVERY PIG IRON

SILICON METAL—OTHER FERROALLOYS

Keokuk Silvery Pig—the superior form of silicon introduction for foundries and steel plants—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.

SALES AGENT: MILLER AND COMPANY
332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

"How is a periodic

Knight Engineering Survey

valuable to management?"

"Through an impartial audit of operations, it points out where and how a foundry can strengthen its competitive position and more fully utilize its manpower and productive capacity."

Knight services include:

Foundry Engineering
Architectural Engineering
Construction Management
Organization
Management
Industrial Engineering
Wage Incentives
Cost Control
Standard Costs
Flexible Budgeting
Production Control
Modernization
Mechanization
Methods
Materials Handling
Automation
Survey of Facilities
Marketing

The rapid pace of improvements in techniques, methods, and machines means a foundry considered modern ten years ago may be out of date today. Drawing on wide experience gained from more than 350 assignments in the foundry field, Knight Engineers are particularly well qualified to know which of the new procedures and equipment are adaptable and can be utilized profitably in a particular foundry. Improved scheduling, proper incentives, an up-to-date cost system are essential to maximum profit today. A Knight Survey can be helpful to your foundry operation. For further information, write or call one of the offices listed below.

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

Member of the Association of Consulting Management Engineers, Inc.
549 W. Randolph St., Chicago 6, Ill.
917 Fifteenth St., N. W., Washington, D. C.
New York Office—Lester B. Knight & Associates, 375 Fifth Ave., New York City 16

Circle 583 on Inquiry Card—Page 51

Make Iron Ductile with Magnesium Ferrosilicon

Mg

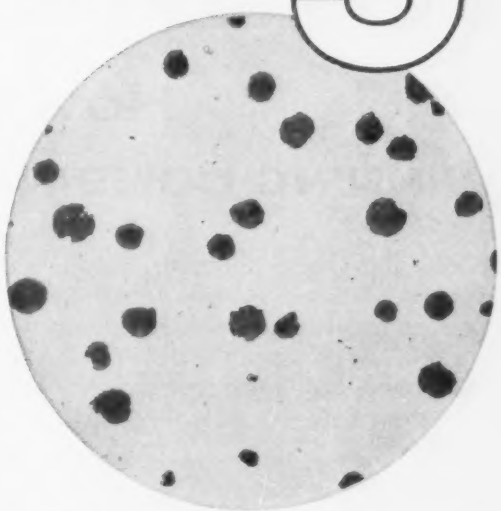
The microstructures shown at the right illustrate how an addition of magnesium converts flake graphite to a spheroidal type and is the key element in the production of "ductile" or "nodular" iron. An economical and convenient source of magnesium for these irons is ELECTROMET magnesium-ferrosilicon. This ladle-addition alloy can be added to iron made in either the cupola or electric furnace and is available in three grades, including 0.5 and 2 per cent cerium-bearing grades. Cerium neutralizes certain elements which inhibit the formation of spheroidal graphite. All three grades contain 1.00 to 1.60 per cent calcium which intensifies the spheroidizing action of magnesium.

To obtain the best combination of ductility and freedom from chill in light sections, the magnesium-ferrosilicon addition is usually followed by a post inoculation with ferrosilicon. ELECTROMET calcium-bearing 85 per cent ferrosilicon is an improved grade used by many ductile iron foundries.

For further information and technical assistance, contact ELECTROMET, supplier of alloys for gray, ductile, and malleable iron.

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.

Offices: Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, Phillipsburg, N. J., Pittsburgh, and San Francisco.



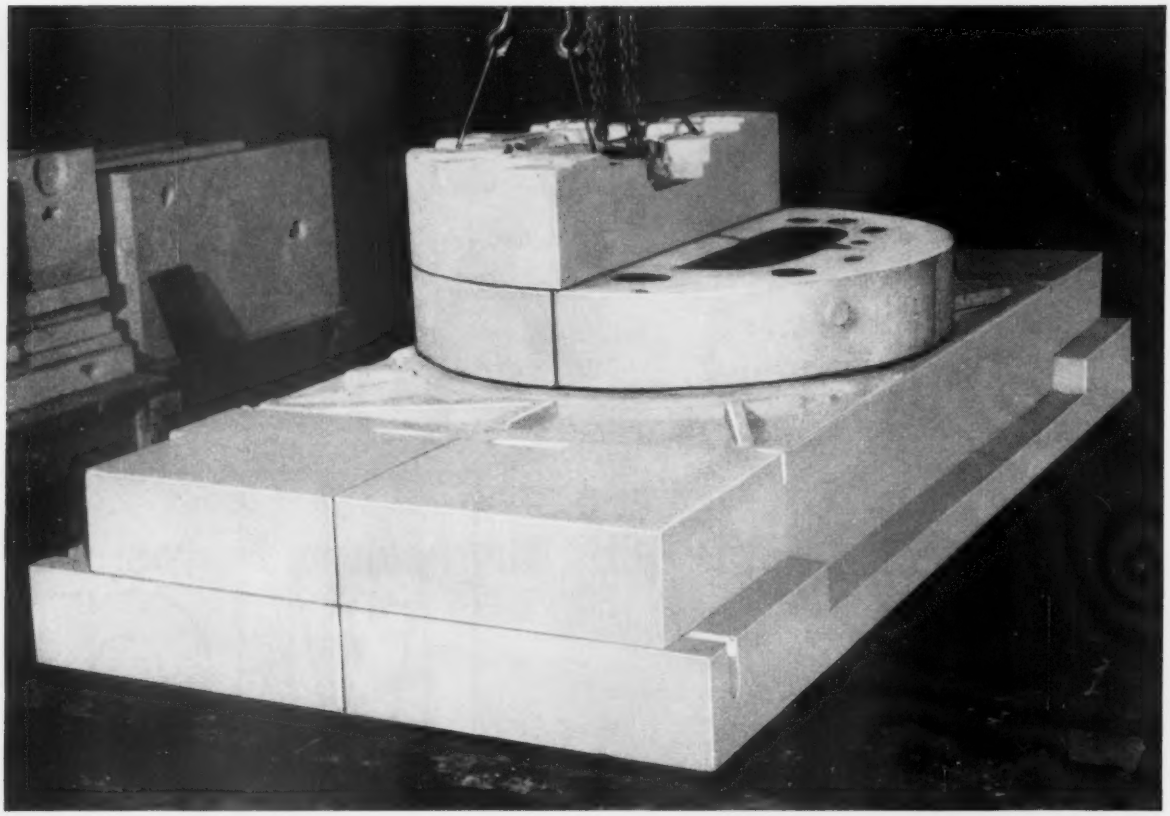
Note in the top micrograph how the graphite flakes break up the continuity of the gray iron matrix, causing low strength and brittleness. In the bottom micrograph, the addition of a small amount of magnesium has changed the graphite structure from flake to the spheroidal type which has less effect on the continuity of the matrix. This "ductile" or "nodular" iron structure is therefore stronger, tougher, and more ductile.

Electromet
FERRO-ALLOYS AND METALS

UNION CARBIDE

NOTE: Since patents cover the use of magnesium in the production of ductile iron, we suggest that you investigate how these patents might affect you.

The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.



How to pick the WINNING COMBINATION of Core Binders

Did you ever stop to consider that a core can go wrong in any of *twenty different ways?* Use the winning combination of such performance-proved binders as Dexocor, Mogul, Kordek and Globe Dextrines—and you'll get top performance all the way.

These famous binders have been developed to complement each other. Regardless of the size and complexity or simplicity of your casting, the metal you're running, your core making and casting facilities, there's a winning combination of binders that will give you best results . . . top quality castings, produced economically and fast.

Help in formulating this winning combination to meet your specific needs is available for the asking. Experienced men on our foundry staff will gladly work with you—no cost or obligation.

CORN PRODUCTS SALES COMPANY
17 Battery Place, New York 4, N. Y.

WINNING COMBINATIONS

For Outstanding Performance on:	Use This Combination of Binders:
Green bond	Mogul plus Dexocor
Dry bond	Dexocor plus Kordek
Green sand	Mogul plus Dextrine or Dexocor
Dry sand	Kordek plus Dexocor
Flowability	Dextrine or Kordek
Moisture resistance	Dexocor
Collapsibility	Dexocor plus Dextrine • Kordek or Mogul
Scratch hardness	Dexocor plus Dextrine or Kordek
Reduced baking time	Dexocor
Reduced gas	Dexocor
Better blowing	Dexocor plus Mogul
Easy ramming	Dexocor plus Mogul
Simplified, cleaner mixing	Dexocor
Easy shake-out	Dexocor • Mogul • Kordek or Dextrine
Reduced veining	Dexocor
Smoother casting finish	Dexocor
Dry, easily handled	Dexocor • Mogul • Kordek or Dextrine
Less waste in handling	Dexocor • Mogul • Kordek or Dextrine
Better core paste	Kordek
Reduced costs	Dexocor plus Mogul

Makers of DEXOCOR® · MOGUL® · KORDEK® · GLOBE® Dextrines

Circle 585 on Inquiry Card—Page 51

Circle 586 on Inquiry Card→

CLEAN IT FAST
WITH
ROTOBLAST®
Pangborn now offers even greater blast cleaning savings with new high-capacity ROTOBLAST units throwing up to 160,000 pounds of abrasive per hour. To see how these ROTOBLAST units are incorporated in Pangborn's new machines for rotoblasting castings, forgings, hot rolled steel, super alloys, etc. write . . .
Pangborn
PANGBORN CORPORATION, Hagerstown 5, Maryland
Manufacturers of Blast Cleaning and Dust Control Equipment

LET'S LOOK at

OVENS for every baking requirement

OVENS that will be faster and less expensive to operate

OVENS that are designed to best fit your operation

Carl Mayer designs and manufactures all types of ovens as well as "specials" to meet unusual operating conditions. Most incorporate the Carl Mayer recirculating heating system with sealed combustion chamber that keeps gases from prematurely escaping into the load area. Cores and molds are baked evenly with no burning. Temperatures are always under control.

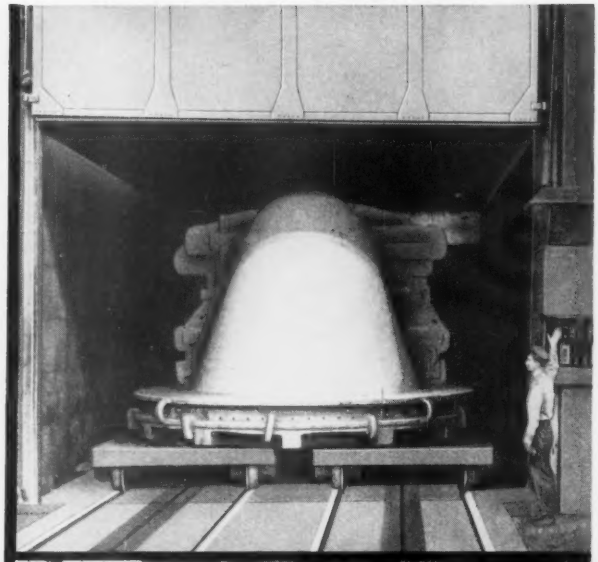
Write for Bulletin 53-CM

TOP RIGHT—This large car type mold oven is installed at Pittsburgh Steel Foundry. Its special triple slotted panel construction reduces heat loss 1/3. Fuel savings up to 50% over old conventional methods are possible. Drying time is often cut in half and temperatures are uniformly controlled.

MIDDLE RIGHT—This rack type core baking oven is at the Fremont Foundry Co., Fremont, Ohio. It is equipped with a recirculating combination gas-oil fired heating system.

BOTTOM RIGHT—Vertical Core Oven (unloading position) at A. C. Williams Company, Ravenna, Ohio. This oven is 11'-0" wide x 11'-0" deep x 45'-0" high.

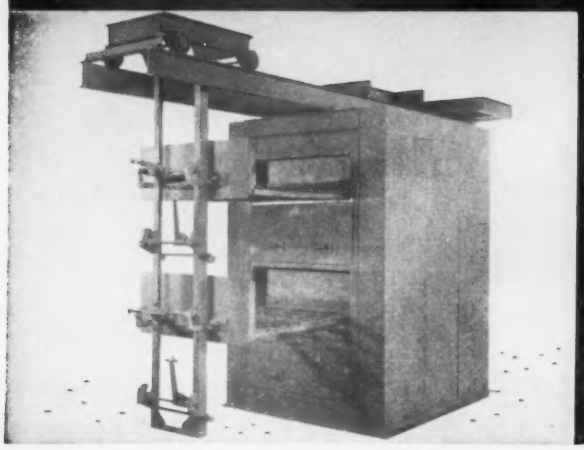
BELOW—Our standard rolling drawer type core baking oven. The heating equipment (not shown) may be mounted on floor beside unit or on the roof. Particularly adaptable to brass and aluminum foundries.

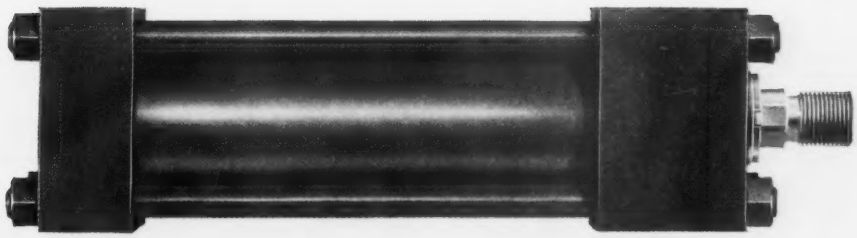


THE **carl mayer** CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories





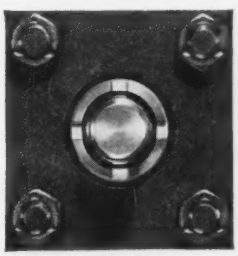
designed for leadership!

The superiority of Hannifin cylinders begins on the drawing board, where Hannifin designers have originated feature after feature not found in other air and hydraulic cylinders. But it doesn't end there...

Hannifin offers more kinds of cylinders, more sizes, more mounting styles. Each manufactured with such exacting control of dimensions and finishes that it not only looks like a better cylinder—its performance proves it!

As more and more discriminating specifiers and buyers are finding, the extra quality you get from Hannifin costs you no more, can usually be delivered sooner.

Why not specify Hannifin by name when you buy?

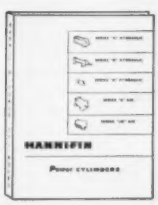


AIR AND HYDRAULIC

HANNIFIN

POWER CYLINDERS

Write for your copy of this new Hannifin Cylinder File—complete, easy-to-use, easy-to-order-from information on five lines of Hannifin cylinders. Hannifin Corporation, 637 South Wolf Road, Des Plaines, Illinois.



Circle 588 on Inquiry Card—Page 51

Used where metals and slags are poured . . .

HARBISON-WALKER
Black Patch

Plastic Graphite Refractory

• reduces costs • improves service

• assures cleaner metal

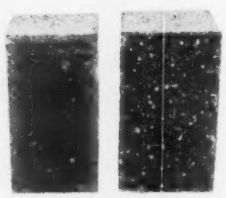
Monolithic linings formed with H-W BLACK PATCH withstand severe corrosive and erosive action of various metals and slags, resist wetting and penetration and remain cleaner because there is less slag adherence.

When heated, Black Patch develops a strong ceramic set and a close texture which, together with the oxidation inhibitors, greatly retard burning of the carbon. In addition, the graphite component enhances the high resistance to thermal shock and increases the refractoriness of H-W BLACK PATCH.

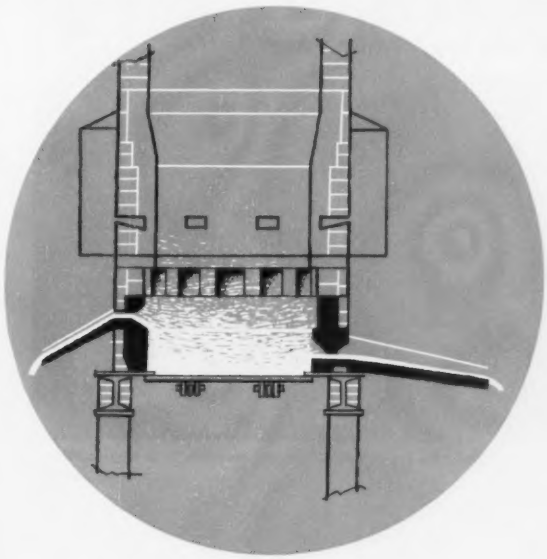
Among the many important applications in which H-W BLACK PATCH serves to great advantage are:

- Holding Ladles
- Pouring Ladles
- Hand Ladles
- Malleable Furnace Runners and Spouts
- Blast Furnace Runners
- Cupola Runners and Spouts
- Cupola Iron and Slag Tapping Holes
- Cupola Tuyere Facings

H-W BLACK PATCH is available in the form of plastic slabs 12″x9″x1″, in a compact mass in drums, or as a dry mixture in sacks, for mixing with water when used.



5-HOUR HIGH TEMPERATURE TEST SHOWS BLACK PATCH SUPERIORITY Result of 5-hour test at 2730°F. Note difference in degree of oxidation. Test piece at left—ordinary graphite plastic; at right—H-W BLACK PATCH.



Harbison-Walker Black Patch used in many applications, provides important benefits such as cleaner metal, lower costs and longer lining life.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES

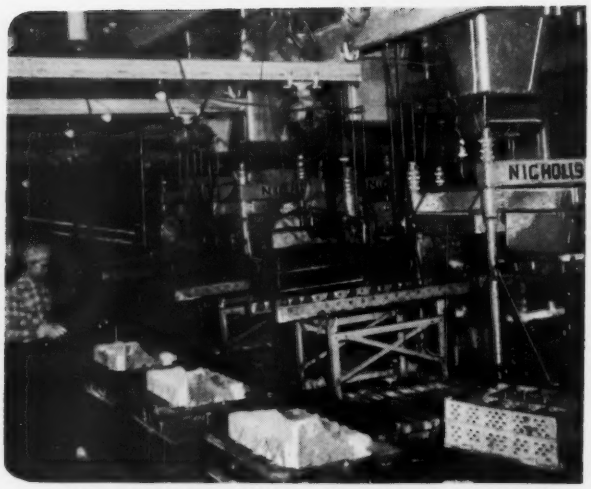
World's Most Complete Refractories Service

GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

Circle 589 on Inquiry Card—Page 51

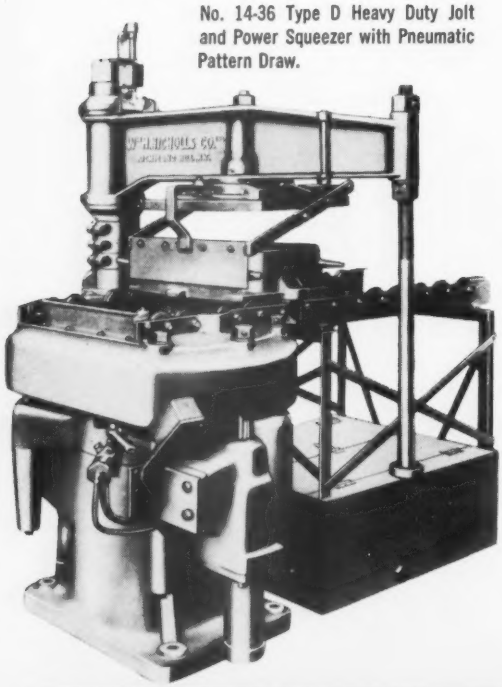
Whatever *your* requirements there's a

NICHOLLS MOLDING MACHINE to fit the job!



A battery of Nicholls "push-button" molding machines in a large foundry.

LARGE OR SMALL . . . MANUAL OR AUTOMATIC



No. 14-36 Type D Heavy Duty Jolt and Power Squeezer with Pneumatic Pattern Draw.

Want ECONOMY?

Minimum working parts, dirtproof housings, forced lubrication **lower maintenance costs.**

Want EFFICIENCY?

Simple operation, safety devices that eliminate dangerous risks and costly mistakes, precision engineering **save materials . . . increase production.**

Want AUTOMATION?

Push-button operation, automatic air-to-air control save manhours . . . **guarantee uniform high-quality molds.**

You can always depend on Nicholls for consistently better molds . . . for a continuous flow of molds . . . for major savings in time and costs which years of experience and scientific know-how make possible. Write, wire, phone TODAY for bulletins, specifications and prices . . . better still, tell us your problems.

WM. H. NICHOLLS CO., INC.
Richmond Hill 18, Long Island, N. Y.
Virginia 9-0064

NICHOLLS

• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT

Circle 590 on Inquiry Card—Page 51

United States Steel Corporation makes varied use of Michigan Tractor Shovel

. . . as *"mechanized handyman"*

Yard maintenance . . . snow removal . . . barge cleanup . . . all of these used to require an assortment of labor and equipment at the huge South Works of U.S. Steel. But now these—and other—jobs are handled quickly, efficiently, economically by the "mechanized handyman" shown . . . a 16 cubic ft Michigan Model 12B Tractor Shovel.

This compact, fast-moving Michigan also materially reduces the cost of maintaining roads and other facilities. Fitted with a towing hook, it often pulls a trailer—then loads it on the spot with asphalt, sand, gravel, dirt or trash.

Its high speed, weight and power can be quickly noted on the job of cleaning up the manganese in barges. Clean-up here used to require laborers with shovels to scoop tailings into piles or boxes that cranes could handle. But an improvement over this method was found. Now a crane simply lowers the Michigan into a barge. Maneuvering easily in the limited space, its power and weight help quickly to scrape and load the last traces of heavy manganese, thus saving hundreds of man-hours every month.

If you can use the services of a "mechanized handyman" like this, why not try one *right in your own plant.* Your local Michigan Distributor will be glad to arrange a demonstration at your convenience. He'll also study your situation, recommend the Michigan model best suited to it. Available sizes: 6 cubic *feet* to 6 cubic *yards;* over 35 different buckets and attachments to customize your Michigan. Many purchase plans, including the famous Clark Lease-Purchase which lets you put a Michigan to work without spending a cent of capital.

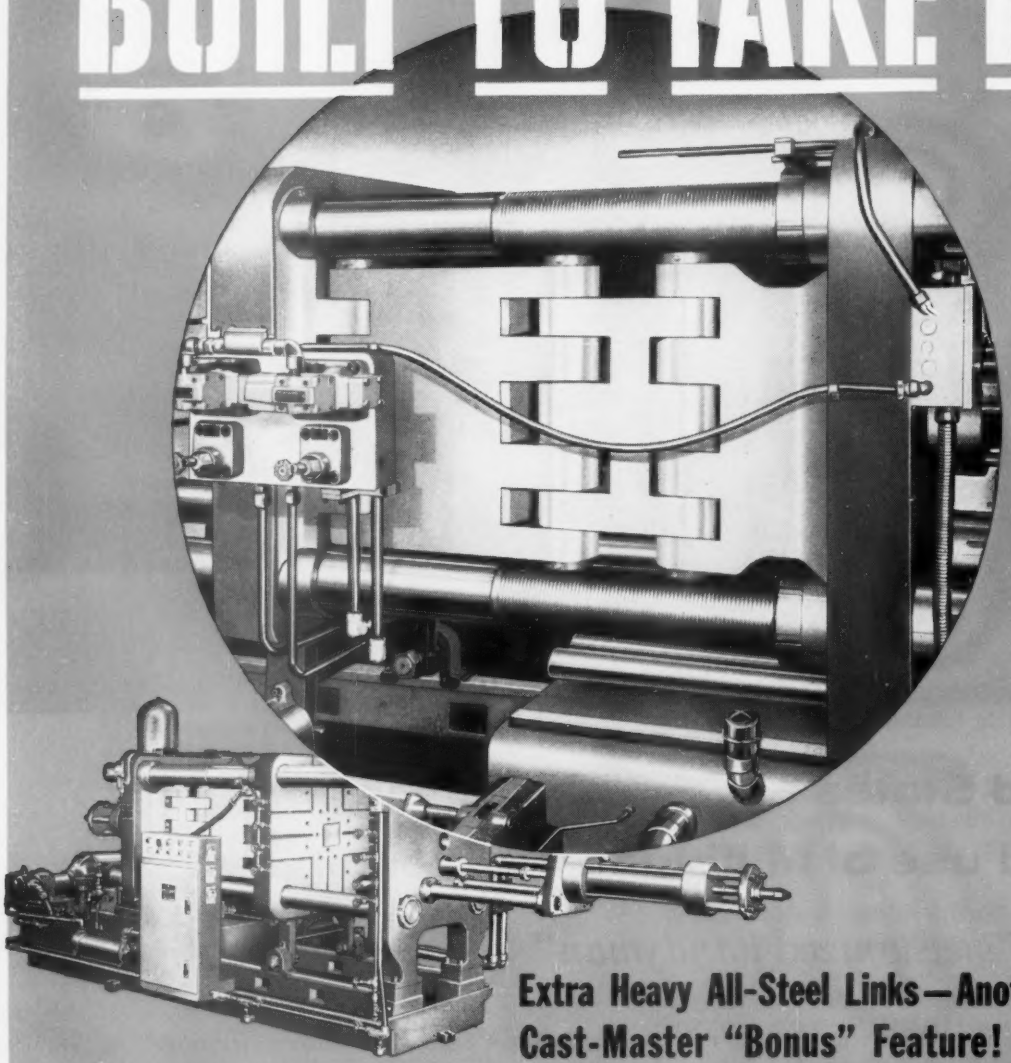
Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Road
Benton Harbor 19, Michigan
In Canada: Canadian Clark, Ltd., St. Thomas, Ontario

CLARK® EQUIPMENT

Circle 591 on Inquiry Card—Page 51

BUILT TO TAKE IT



Extra Heavy All-Steel Links—Another Cast-Master "Bonus" Feature! . . .

The story of Cast-Master quality is a story of "bonus" features — like the link system shown here. Cast-Master links are super-rugged — all-steel — machined — with wide spread for positive lock-up, and multiple shear points to eliminate link pin breakage. Result? — more precision — lower maintenance costs for Cast-Master owners. To get the complete "bonus" story, send for the new Cast-Master catalog. It describes exclusive Cast-Master developments, gives detailed specifications on eight new models that are setting the pace for the industry.

EASTERN REPRESENTATIVE: Milton Harmon, 18 Rock Road, Milford, Connecticut

CAST-MASTER *Inc.* 23901 AURORA ROAD
BEDFORD, OHIO

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FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 214 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FURTHER INFORMATION on Advertised Products ?

October 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626	641	656	671	686	701	716	731	746	761	776	791	806	821	836	851	866
522	537	552	567	582	597	612	627	642	657	672	687	702	717	732	747	762	777	792	807	822	837	852	867
523	538	553	568	583	598	613	628	643	658	673	688	703	718	733	748	763	778	793	808	823	838	853	868
524	539	554	569	584	599	614	629	644	659	674	689	704	719	734	749	764	779	794	809	824	839	854	869
525	540	555	570	585	600	615	630	645	660	675	690	705	720	735	750	765	780	795	810	825	840	855	870
526	541	556	571	586	601	616	631	646	661	676	691	706	721	736	751	766	781	796	811	826	841	856	871
527	542	557	572	587	602	617	632	647	662	677	692	707	722	737	752	767	782	797	812	827	842	857	872
528	543	558	573	588	603	618	633	648	663	678	693	708	723	738	753	768	783	798	813	828	843	858	873
529	544	559	574	589	604	619	634	649	664	679	694	709	724	739	754	769	784	799	814	829	844	859	874
530	545	560	575	590	605	620	635	650	665	680	695	710	725	740	755	770	785	800	815	830	845	860	875
531	546	561	576	591	606	621	636	651	666	681	696	711	726	741	756	771	786	801	816	831	846	861	876
532	547	562	577	592	607	622	637	652	667	682	697	712	727	742	757	772	787	802	817	832	847	862	877
533	548	563	578	593	608	623	638	653	668	683	698	713	728	743	758	773	788	803	818	833	848	863	878
534	549	564	579	594	609	624	639	654	669	684	699	714	729	744	759	774	789	804	819	834	849	864	879
535	550	565	580	595	610	625	640	655	670	685	700	715	730	745	760	775	790	805	820	835	850	865	880

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Page No.	Title of Article
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This card good in U.S. and Canada only—Expires Dec. 15, 1957

NAME .....

POSITION .....

FIRM .....

STREET .....

CITY ..... ZONE.....

STATE .....

PRODUCT MANUFACTURED .....

FURTHER INFORMATION on Advertised Products ?

October 1957

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529	544	559	574	589	604	619	634	649	664	679	694	709	724	739	754	769	784	799	814	829	844	859	874
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533	548	563	578	593	608	623	638	653	668	683	698	713	728	743	758	773	788	803	818	833	848	863	878
534	549	564	579	594	609	624	639	654	669	684	699	714	729	744	759	774	789	804	819	834	849	864	879
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FOUNDRY

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FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

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FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

How a Foundry Stopped Scabs and Buckles ...with MAPLEX®

PROBLEM:

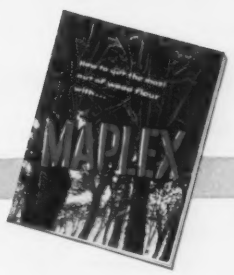
Have you ever jumped out of the frying pan of scabs and buckles into the fire of cuts and washes? This happened recently in a midwest foundry when it counted on the expansion value of wood flour but ignored its effect on hot strength.

SOLUTION:

The IMC sand man quickly spotted the heart of the problem . . . their choice of wood flour. Consideration of the total effect of the flour indicated the need for hard maple. *Maplex* provided the protection against scabs, buckles and rattails, while the increased hot strength at 2000°F avoided any danger of cuts and washes. These benefits were in addition to the usual wood flour effects on flowability, shake-out, peel and cleaning.

You'll find that the man from IMC, an experienced expert in sand problems, can be of great help. It's his job to recommend the correct materials and the proper procedures to help you make better castings at lower cost.

For helpful information on wood flour, write for our booklet "How to get the most out of wood flour with Maplex"



EASTERN CLAY PRODUCTS DEPT.
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
20 NORTH WACKER DRIVE, CHICAGO 6 • PHONE: Financial 6-1800

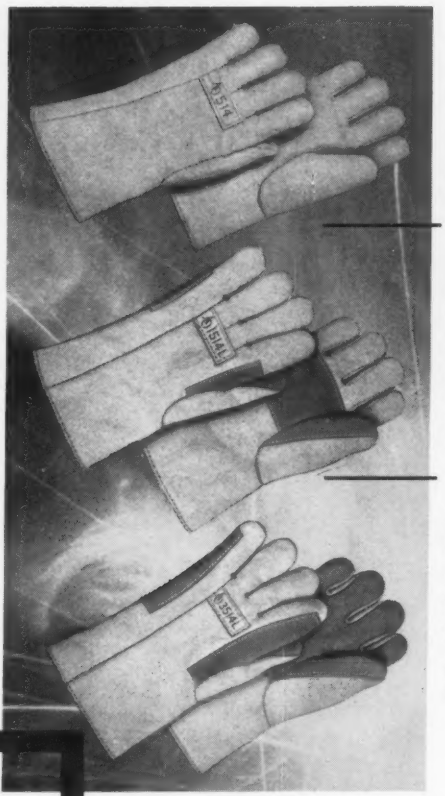
Thanks to American Optical's
"Operation Seam-Elimination"
More Comfort... Longer Wear with

Asbestos Gloves

AO Asbestos Gloves

Because seams have always been the most vulnerable part of a glove, American Optical in our "Operation Seam-Elimination" has done away with as many seams as possible. Result: our asbestos gloves now have only three seams, as compared to as many as eight on most gloves. For example, there's only one seam down the back whereas other gloves have four. There are no seams across the front and back of cuffs — no seams down the sides of the hand. THIS, COMBINED WITH AMERICAN OPTICAL'S QUALITY UNDERWRITER'S GRADE ASBESTOS MEANS LONGER WEAR AND FEWER REPLACEMENTS. More for your money, in other words.

This important pattern development is available on all American Optical asbestos gloves — whether plain, palm leather faced or asbestos reinforced palm — 11", 14" or 23". Lined or unlined.



514 Plain Asbestos Glove

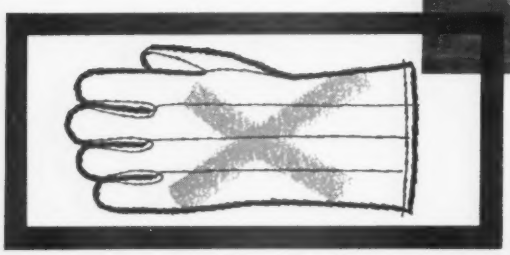
14 inches long (Available 11 inches long as NO. 511; 23 inches long as NO. 523) Note only 3 seams. Lined or Unlined.

1514L Lined Leather Reinforced Asbestos Glove

Reinforced on palm and thumb with chrome-tanned split leather. Specially tanned to resist heat (Available 11 inches long as NO. 1511; 23 inches long as NO. 1523) Lined or Unlined.

3514L Lined Full Leather Reinforced Asbestos Glove

Reinforced from wrist to tips of fingers on palm side with chrome-tanned split leather. Recommended especially for hot mill and coil tying in steel mills. Lined or Unlined.



NO SEAMS

Always insist on Trademarked Safety Products. Your nearest AO Safety Products Representative can supply you.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

A Touch here does so much

How 'dag'® saves time, metal, and money in making chilled castings

The rather simple procedure of painting a thin coating of a 'dag' dispersion on chills can effect real economies in the production of metal castings. A highly refractory dry lubricating film is formed, which prevents the casting from fusing to the chill, while greatly improving surface qualities as well.

The net result? Considerable savings on rejects and metal loss.

Yet this is only one of many benefits 'dag' colloidal graphite dispersions offer foundries. As an ingot-mold wash, 'dag' notably increases mold life. As a chilling agent, 'dag' hastens solidification of heavy sections in permanent-mold castings.

Foundrymen everywhere rely on 'dag' since it tolerates any temperature met in the foundry, does not adsorb harmful gases, is chemically inert, and contributes much to over-all high-quality production.

An Acheson Service Engineer will be glad to show you how versatile 'dag' dispersions can help *you* produce fine castings. Bulletin 425 will provide additional valuable information; for your copy, address Dept. F.-10.

dag®

ACHESON COLLOIDS COMPANY

Port Huron, Michigan...also Acheson Colloids Ltd., London, England

ACHESON COLLOIDAL DISPERSIONS:
Graphite · Molybdenum Disulfide · Zinc Oxide · Mica and other solids

Offices in: Boston · Chicago · Cleveland · Dayton · Detroit · Los Angeles
Milwaukee · Philadelphia · New York · Pittsburgh · Rochester · St. Louis · Toronto

Circle 595 on Inquiry Card—Page 51

THESE FOUNDRIES USE EXTRA-LARGE "POP-OFF" FLASKS SUCCESSFULLY

Here is a partial list of leading U.S. and Canadian foundries that have slashed costs through the use of extra-large HINES "POP-OFF" flasks and jackets. Sizes listed are the *largest* used, in each case. Practically all of these foundries have many other large HINES flasks and jackets in regular service.

HINES "POP-OFF" equipment not only makes for economy in initial cost, but also provides savings by minimizing scrap, reducing shake-out costs and by saving floor space. Then add extra-long service and trouble-free performance and it's easy to understand why so many foundries prefer HINES equipment.

If you are now using large tight flasks, we'd like an opportunity to prove that you'd be better off with a "POP-OFF" installation. If you're interested, please write or phone us in Cleveland.

ALABAMA

HOLT	Central Foundry Company	23x66x7/7

CALIFORNIA

BERKELEY	Berkeley Brass Foundry Co.	27x36x8/5
EL MONTE	Gregg Iron Foundry	24x32x16/16
LOS ANGELES	Los Angeles Steel Casting Co.	28x28x10/10
	Reliable Iron Foundry, Inc.	28x36x11/10
	Renfrow Foundry Co.	30x48x16/16
VERNON	Utility Steel Foundry	26x38x6/5

COLORADO

LITTLETON	Electron Corporation	36x40x12/6

DELAWARE

WILMINGTON	Eastern Malleable Iron Co.	17x54x6/6

GEORGIA

ROME	Griffin Foundry & Mach. Co.	42x42x12/8
WEST POINT	West Point F'dry & Mach. Co.	17x33x6/6

ILLINOIS

CHICAGO	Chicago Malleable Castings Co.	18x54x6/4
	McCormick Works	14x48x5/5
ELGIN	Woodruff & Edwards, Inc.	27x40x8/5
ROCKFORD	Gunite Foundries Corporation	19x44x8/6

INDIANA

ATTICA	Harrison Steel Castings Co.	21x32x7/7
BLUFFTON	Sterling Casting Corporation	26x28x8/4
WARSAW	Dalton Foundries, Inc.	25x40x10/9

KANSAS

WICHITA	Midwest Foundry, Inc.	16x40x8/6

MASSACHUSETTS

GILBERTVILLE	Pioneer Foundry & Mfg. Co.	21x66x7/7

MICHIGAN

ALBION	Gale Manufacturing Co.	28x40x12/11
CLIO	Clio Foundry, Inc.	14x28x6/6
EAST JORDAN	East Jordan Iron Works	28x37x6/9
IMLAY CITY	Brisk Foundry & Machine Co.	19x36x6/5
KALAMAZOO	U.S. Foundry Corporation	18x46x6/5

MINNESOTA

SHAKOPEE	Shakopee Foundry Co.	22x36x7/7

NEW HAMPSHIRE

FRANKLIN	Hebert Manufacturing Co., Inc.	30x42x6/4

NEW YORK

BUFFALO	Pratt & Letchworth Co.	24x40x8/8
PHELPS	Ontario Foundry Company	18x74x6/4
VOORHEESVILLE	Albany Castings Co., Inc.	26x40x10/12

Circle 596 on Inquiry Card—Page 51

to cut costs!

NORTH CAROLINA

GREENSBORO	Wysong & Miles Foundry, Inc.	18x42x8/6

OHIO

CANTON	Union Metal Manufacturing Co.	36x36x7/8
CLEVELAND	Forest City Foundries Co.	20x44x6/5
	Lake City Malleable Co.	28x28x7/5
	Madison Foundry Company	36x36x16/14
DAYTON	Duriron Company, Inc.	19x25x10/9
ELYRIA	Elyria Foundry Division	30x30x9/7
	Chromalloy Corporation	
GRAFTON	W. O. Larson Foundry Co.	20x64x7/6
LOCKLAND	Sawbrook Steel Castings Co.	18x44x6/4
SANDUSKY	Farrell Cheek Steel Co.	28x28x8/8
SPRINGFIELD	Ohio Steel Foundry Co.	16x45x6/8
TOLEDO	Unitcast Corporation	24x36x12/12

OREGON

PORTLAND	Electric Steel Foundry Co.	20x48x9/10

PENNSYLVANIA

BOYERTOWN	Eastern Foundry Company	26x48x7/7
EMMAUS	Emmaus F'dry & Mach. Co.	15x48x7½/6
ERIE	Weil-McLain Company	16x35x7/5
HALLSTEAD	Hallstead Foundry, Inc.	26x28x13/4
LANSDOWNE	Crucible Steel Casting Co.	24x42x9½/9½
POTTSTOWN	March-Brownback Co., Inc.,	42x42x7/5
READING	Empire Steel Castings, Inc.	22x52x8/8
	Reading Gray Iron Castings	30x30x6/6
SCOTTDALE	The Duraloy Company	14x50x6/6
WILKINSBURG	The Calorizing Company	36x48x9/6
WYOMING	United Foundries, Inc.	45x45x9/6

SOUTH CAROLINA

GREENVILLE	Steel Heddle Mfg. Co.	18x36x6/5
SPARTANBURG	Draper Corporation	16x50x4/4

TEXAS

LUFKIN	Texas Foundries, Inc.	33x38x17/17
TYLER	Tyler Pipe & Foundry Co.	30x42x10/10

WASHINGTON

EVERETT	Washington Stove Works	16x48x8/4

WEST VIRGINIA

PARKERSBURG	Mountain State Steel Fdys., Inc.	21x32x7/6

WISCONSIN

BELOIT	Yates-American Machine Co.	20x44x9/8
MILWAUKEE	Grede Foundries, Inc.	20x36x8/8
	Pioneer Foundry Corporation	32x40x7/7
RACINE	Lakeside Malleable Castings	28x28x10/4
WAUKESHA	Grede Foundries, Inc.	14x42x7/7
WHITEWATER	Whitewater Manufacturing Co.	20x48x6/4

CANADA

GUELPH	International Mall. Iron Co.	23x30x10/8
	Rockwell Manufacturing Co.	16x40x9/4
HAMILTON	McCoy Foundry Co., Ltd.	32x32x6/5
LONG BRANCH	Neptune Meters, Ltd.	23x28x6/4
MIMICO	Soil Pipe & Fittings, Ltd.	15x39x5/4
OTTAWA	Beach Foundry, Ltd.	30x48x6/4

HINES POP-OFF FLASK — FEMA

We greatly appreciate the cooperation extended by the above foundries in permitting us to use their names in the preparation of this advertisement.

THE HINES FLASK CO.

3431 West 140th Street • Cleveland 11, Ohio

Phone: ORchard 1-2806

POWER FOR GROWTH—Utility companies across the nation are building new plants to meet the demands of an expanding economy. They rely on foundries for the huge castings for turbines and other generating equipment they require.

TRULINE® BINDER HELPS KEEP FOUNDRIES HUMMING

When foundries are facing a full work schedule, Truline Binder can help keep castings moving smoothly from the oven to the cleaning room.

Truline's fast bake often means that one oven can do the work of two. Cores molded with Truline are strong, collapse readily, and are easily removed by knockout or hydroblast. Semi-finished castings need a minimum of repairs and welding when Truline is used.

In the core room, in the molds, in the cleaning room—every step of the way—Truline Binder can mean improved efficiency and reduced manhours per ton.

For information on Truline Binder, write:

HERCULES

Pine Chemicals Division, Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Del.

NF57-2

FOR THE FIRST TIME!...

ADJUSTABLE ALUMINUM

ARMY TYPE

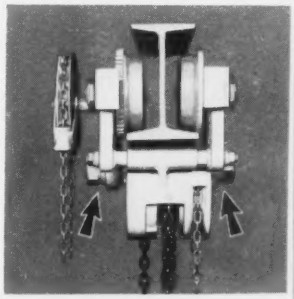
TROLLEY HOISTS

. . . ¼ THRU 10 TON CAPACITY RANGE

CAPACITIES
Push Models: ¼ to 10 Tons
Hand Geared Models: 1 to 10 Tons

New 'Budgit' Aluminum Army Type Trolley Hoists — another "first" from "Shaw-Box" — are designed to save you time, trouble and money. The complete line includes 8 hand geared and 10 push models. On every capacity . . .

It's Easy to Adjust the Trolley to Fit the I-Beam!



You can work a 'Budgit' Aluminum Army Type Trolley Hoist from an I-beam of one size today and switch to another size I-beam any time — easily. Just relocate the spacer washers on the trolley cross shafts during installation. That's all there is to it. The more washers "sandwiched" between trolley side plates and hoisting unit, the bigger the I-beam the trolley will fit. Depending on hoist capacity, adjustment can be made for I-beam sizes ranging from 4" to 24".

The trolley side plates are non-fracturing rolled steel with end bumpers that serve as safety lugs on all but the smallest models. Long-life sealed ball bearing in all wheels assure smooth travel. Wheel treads on the larger capacity models are flame-hardened for longer wear. On hand geared models, the wheel and guide are weatherproof aluminum alloy. All hand chains are cadmium plated to resist rust and corrosion.

'Budgit' Aluminum Army Type Trolley Hoists have high hook lift and exceptional low headroom advantages. The heavy-section aluminum alloy hoist frame and covers save weight yet have great shock resistance. "Equa-torque" spur gearing distributes the load evenly on two sides of each gear; anti-friction bearings also contribute to high efficiency. Practically all muscle effort is converted to useful work. 500 lbs. can be lifted with a hand chain pull of only 25 lbs.

For extra safety, the load chain, gears and shafts are tough heat-treated alloy steel; the forged steel load hook opens slowly on extreme overloads. No pressed fits, no keys or keyways to wear or shear — spline connections are used throughout. All parts operate in sealed housings. Maintenance is easy.

EXCEPTIONAL LOW HEADROOM DUE TO MODERN DESIGN

GET ALL THE FACTS

Light, adaptable 'Budgit' Aluminum Army Type Trolley Hoists are built rugged for years of money-saving service. Spark and corrosion resistant models available. *Call your "Shaw-Box" Distributor for details or write us for Bulletin 15010-10-57.*

57C – 12C

MAXWELL MANNING & MOORE INC. MM&M TRADE MARK

'Budgit'® CHAIN BLOCKS

MANNING, MAXWELL & MOORE, INC.

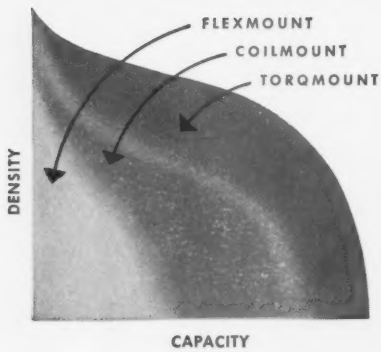
386 West Broadway • Muskegon, Michigan

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Other Divisions produce 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

First time from any one source...

a complete line of oscillating conveyors



3 LINK-BELT designs cover all capacity/density requirements for low-cost conveying of all types of materials.

HERE'S an example of how Link-Belt can match your sand and castings handling requirements with the right-capacity oscillating conveyor from industry's *only* complete line. All three installations at right were chosen to satisfy specific capacity demands. Each of these conveyors is all-metal, with a minimum of moving parts.

Link-Belt *Positive Action* controls the load at all times . . . assures continuous, uniform flow regardless of surges. It's supplemented by *natural frequency* which minimizes power requirements. For the best in light, medium or heavy-duty conveying, call your nearby Link-Belt office or authorized stock-carrying distributor. Or for facts on the complete line, write for Book 2444 featuring Flexmount and Torqmount, and Book 2644 covering Coilmount.

LINK-BELT

14,640

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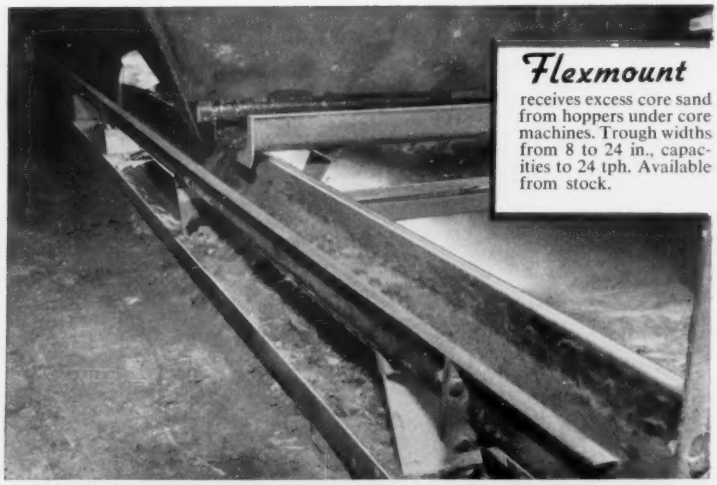
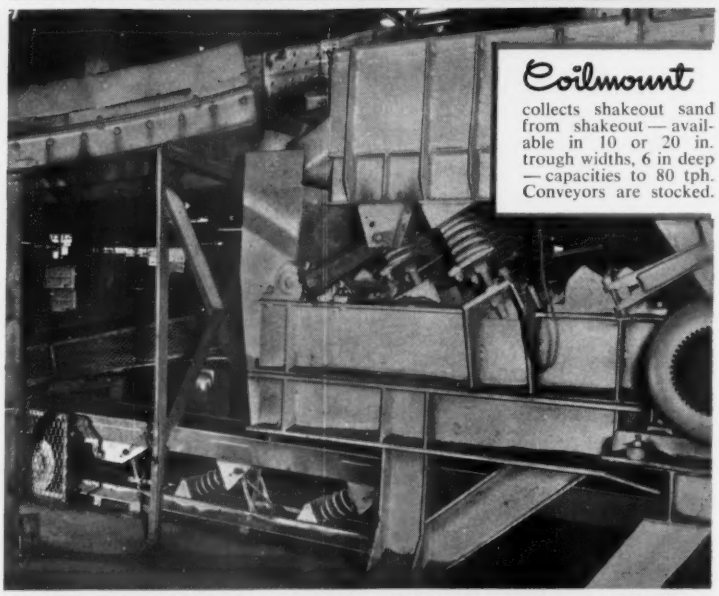
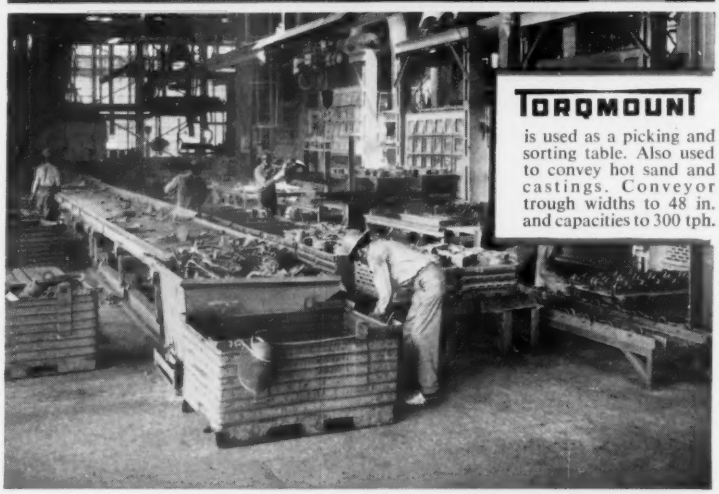
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.



Flexmount
receives excess core sand from hoppers under core machines. Trough widths from 8 to 24 in., capacities to 24 tph. Available from stock.



Coilmount
collects shakeout sand from shakeout — available in 10 or 20 in. trough widths, 6 in deep — capacities to 80 tph. Conveyors are stocked.



TORQMOUNT
is used as a picking and sorting table. Also used to convey hot sand and castings. Conveyor trough widths to 48 in. and capacities to 300 tph.

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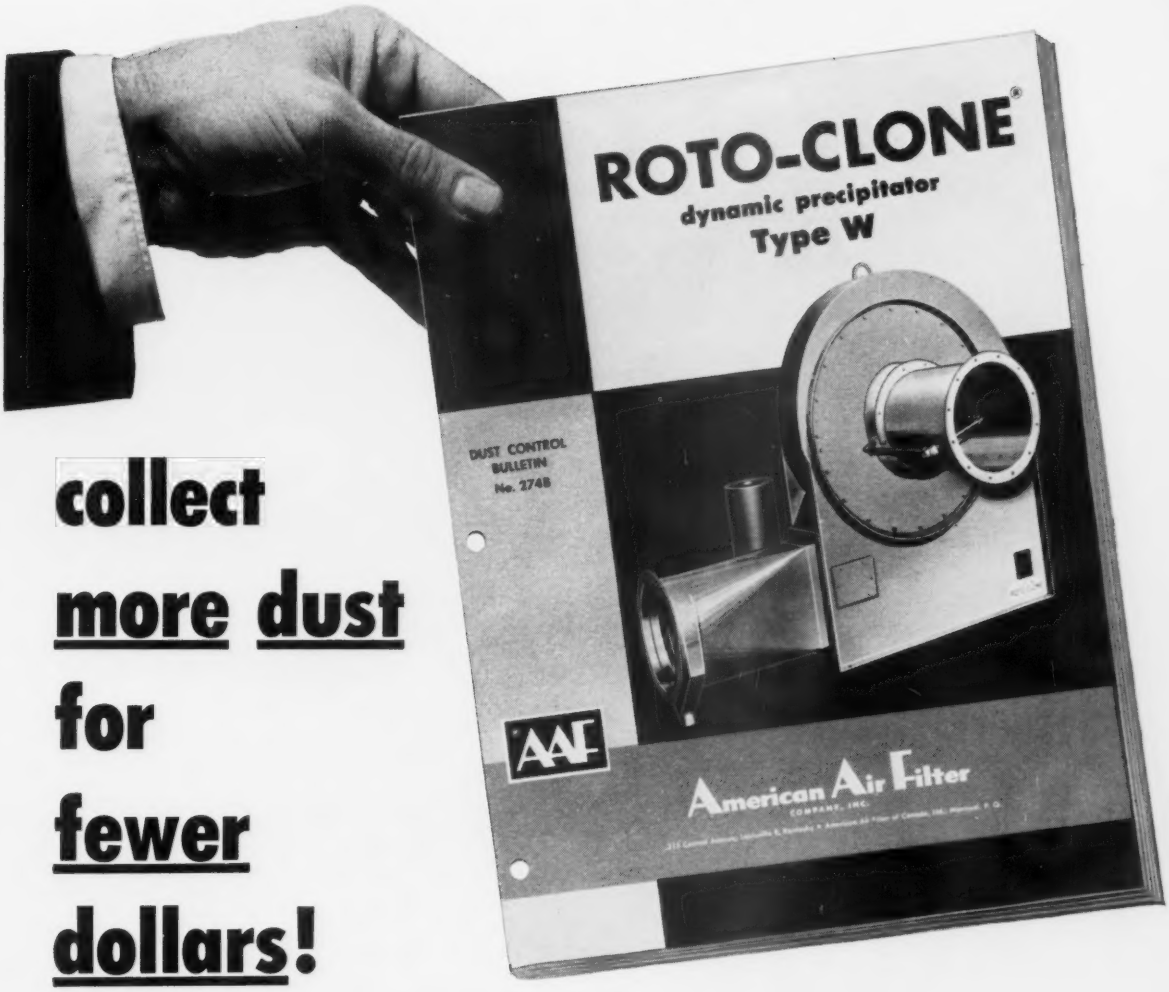

collect more dust for fewer dollars!

New 16-page booklet gives all the facts on AAF's improved Type W ROTO-CLONE

Here are the facts on the very latest improvements in AAF's Type W ROTO-CLONE—the "hottest" wet dust collector in industry since 1937. This 16-page booklet is chock full of data on arrangements, dimensions, performance characteristics, engineering data, and humidifying action.

The distinguishing feature of the Type W is the addition of water sprays to the basic principle of dynamic precipitation. This results in collection of even the lightest and finest dust particles and delivers collected dust in a slurry for easy disposal.

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Please send me Bulletin 274B which describes AAF's wet-collecting Type W ROTO-CLONE.

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Company_____

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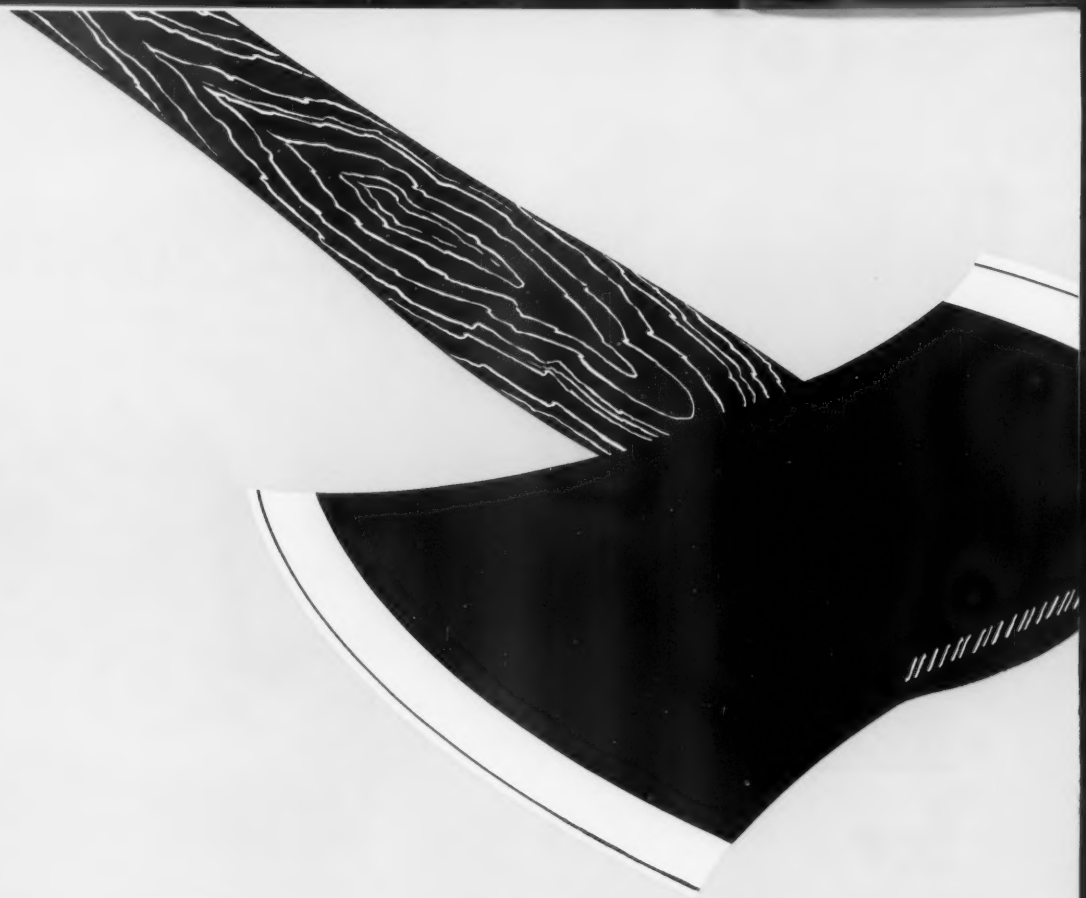

"NO AXE TO GRIND"

Making more than one type core?

Anxious to experiment with contemporary core making systems?

Want to speed up core production?

One "yes" is reason enough to ask your supplier of core binders whether he favors one system over another; whether he can offer binders for every core system – resin-bonded, air-set, CO_2 gassed, or oil bonded. Since the Archer Quality line has been expanded, ADM can supply superior binders for every core system. For the first time, we truly have NO AXE TO GRIND for any method in current use. For this reason, it might pay to call the Archer Representative in your area for a real shirt-sleeve discussion . . . or, if you prefer, write directly to ADM.

Archer-Daniels-Midland company

FOUNDRY PRODUCTS DIVISION
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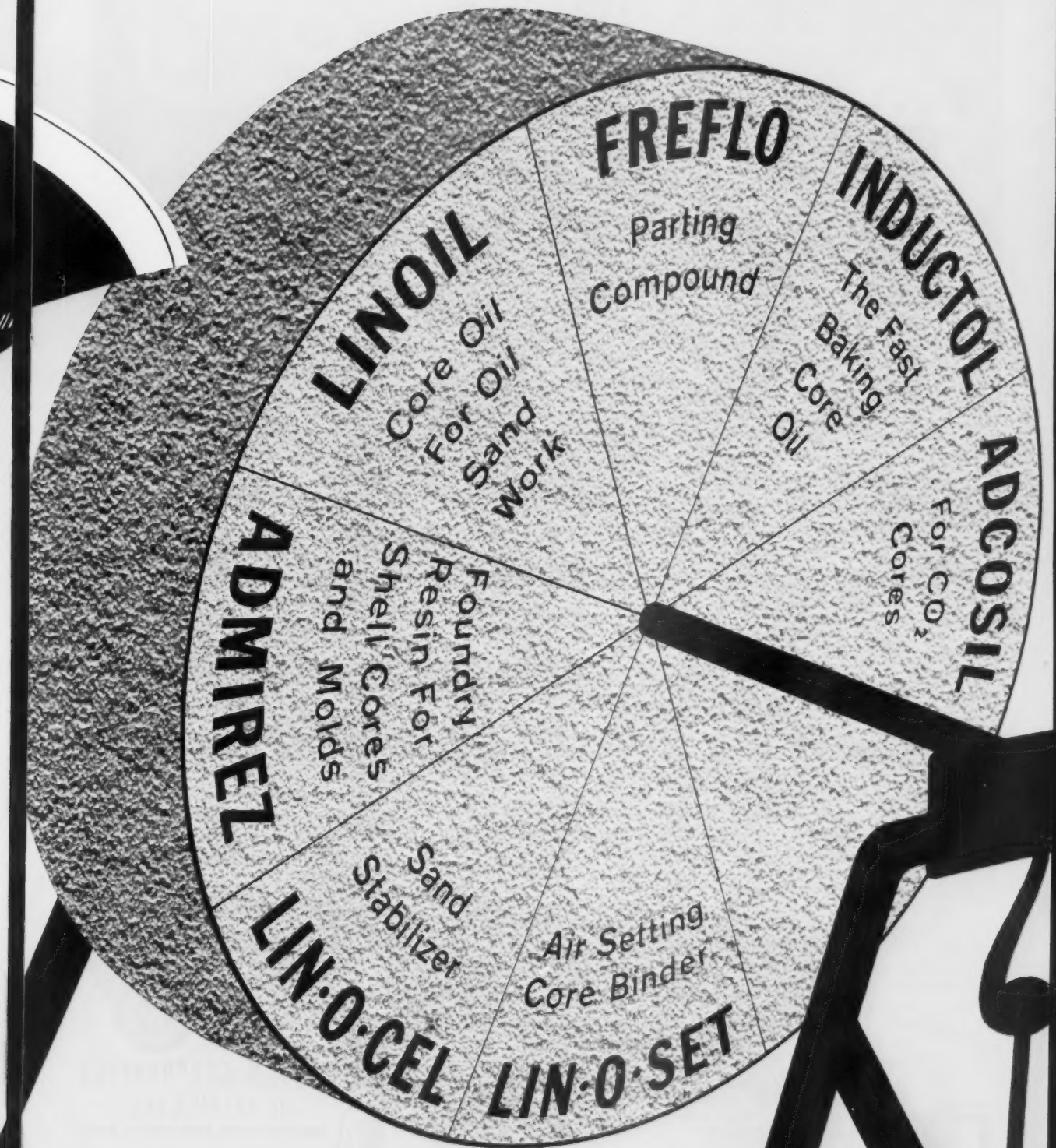

Augmenting the Archer Quality Line . . .

These additional foundry products are available through ADM'S new subsidiary, The FEDERAL FOUNDRY SUPPLY Company:

SAN-BLO CORE BLOWER
WHIRLMIX SAND MIXERS
FEDERAL GREEN BOND BENTONITE
FEDERAL SAND STABILIZER
CROWN HILL SEA COAL
. . . and a COMPLETE LINE of FOUNDRY FACINGS

Circle 601 on Inquiry Card—Page 51

burg Times Herald

JANUARY 15, 1957

BETTER PRODUCTS SECTION

PHOTO COURTESY AMPCO METAL, INC., MILWAUKEE, WIS.

LITHIUM DE-OXIDIZES HUGE COPPER CASTING 99.8% Conductivity Obtained

MINNEAPOLIS—Special Ampco Metal, Inc., Milwaukee, Wis., obtained high structural soundness and electrical conductivity for the centrifugally cast copper ring (photo above) used in casting aluminum. As-cast weight of the ring was 1800 lbs. Approximate as-cast size is 50" O.D., 6" thick.

LESS THAN 1/5 of a pound of metallic lithium added to the melt resulted in a dense, oxygen-free casting minus only .2% of being 100% conductive.

AS LITTLE AS 0.005% (2¼ gram cartridge) refines high temperature copper, brass, bronze, and nickel-silver, producing a sounder, more uniform casting.

THE SALTS of Lithium, Carbonate and Chloride benefit the heat treater by lowering bath melting points.

Is your foundry using Lithium? Our banks of electrolytic cells can supply experimental grams or commercial tons. Send for details.

(ADVERTISEMENT)

Lithium Firm Doubles Sales for 9 Months

Lithium Corporation of America, Minneapolis, reported Thursday that in the first nine months of 1956 its net sales were more than double those in the same 1955 period.

Herbert W. Rogers, president, in a report to stockholders, said sales were $8,699,028 in the nine-month period, compared with $4,276,... the same period a ye...

...1956 perio... ...ared wi...

Green Giant to Spend 2½ Millions on Can Plant and Warehouses

...t Co., Le Sueur, ...ed to a 47-per-cent increase ... Tuesday it ... net sales ar... ...pared ... ...ss of ...

... trends ahead in industrial applications for lithium

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LITHIUM CORPORATION OF AMERICA, INC.

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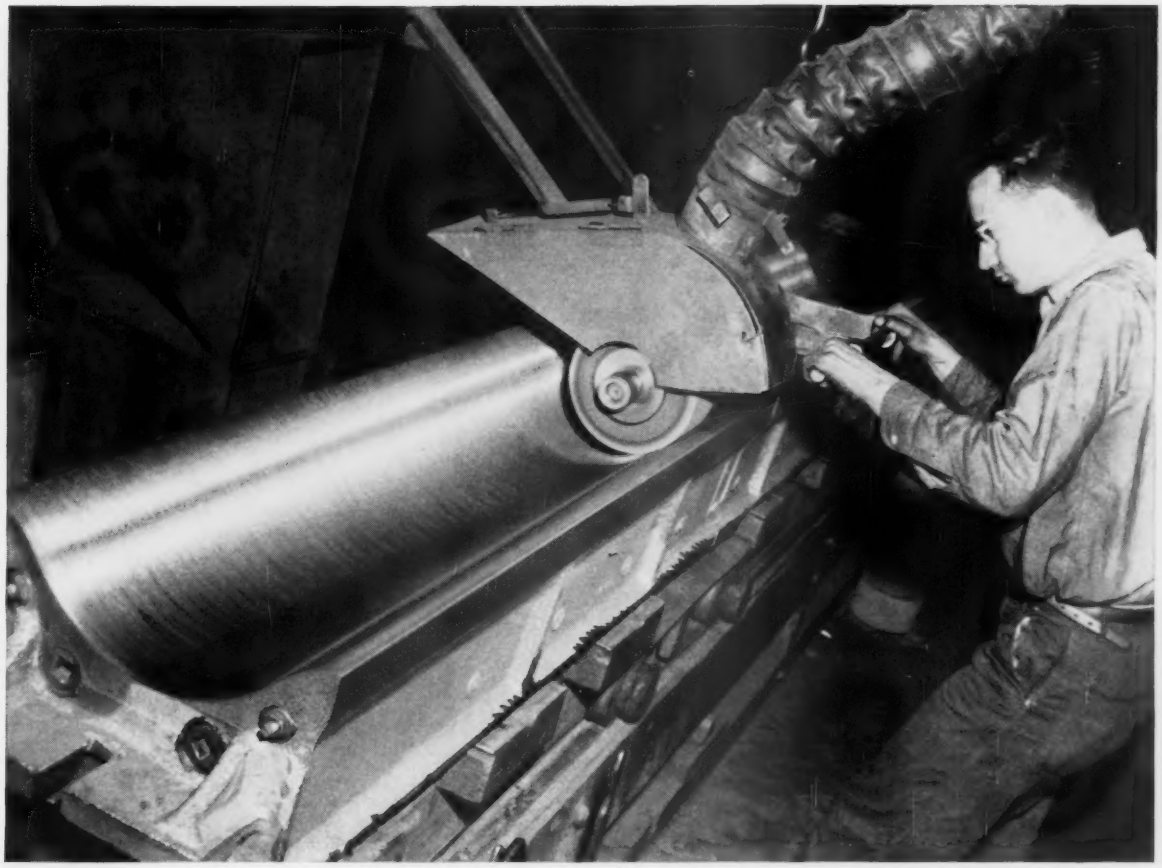
RESEARCH LABORATORY: St. Louis Park, Minnesota



American Laundry Machinery Company steam chests, cast with Hanna pig iron, need no plating. Instead, the casting is machined, ground and buffed to satin smoothness.

HANNA PIG IRON helps American Laundry Machinery Company iron flatwork fast and smooth

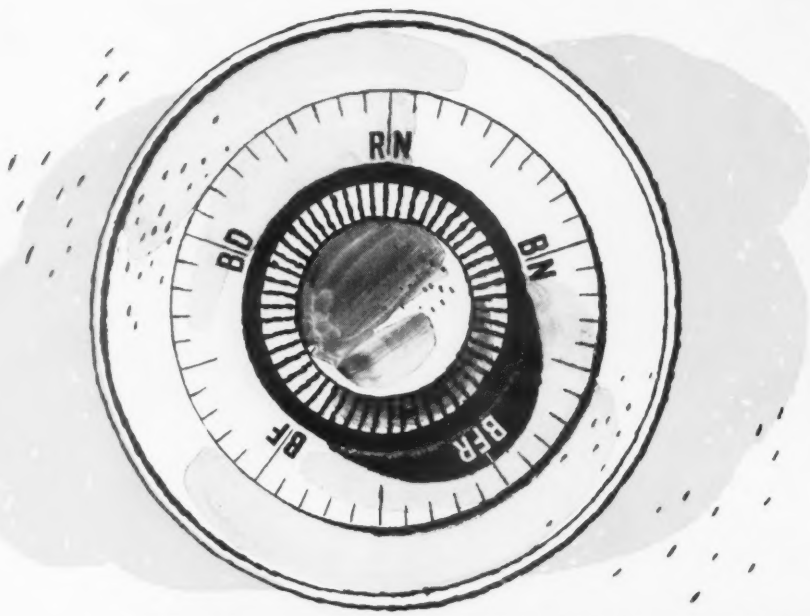
Laundrymen all over the country rely on equipment made by American Laundry Machinery Company for smooth, fast, large-volume ironing. They know that American Laundry Machinery Company's exacting quality standards assure good results with a minimum of wear.

Ever since the opening of their foundry in Rochester, New York, American Laundry Machinery Company's material specifications have called for Hanna pig irons. Since its development, the even higher strength HannaTite Pig Iron has been specified. This is a step taken to maintain the high quality required in such work as this flatwork ironer steam chest casting—a pressure vessel that must safely hold dry, saturated steam at 125 lbs. per square inch gage pressure. This application requires castings that upon machining are flawless and uniformly smooth—a specification met by the tight, fine-grained, pearlitic structure of HannaTite Pig Iron.

Hanna's high metallurgical qualities are synonymous with denser, stronger castings. Hanna makes all regular grades of pig iron, as well as HannaTite and Hanna Silvery. All grades are available in two sizes—the 38-pound pig and the smaller HannaTen ingot. Hanna representatives are always happy to be of service.

HANNA
THE BEST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION



Your "RIGHT COMBINATION" for countless grinding jobs

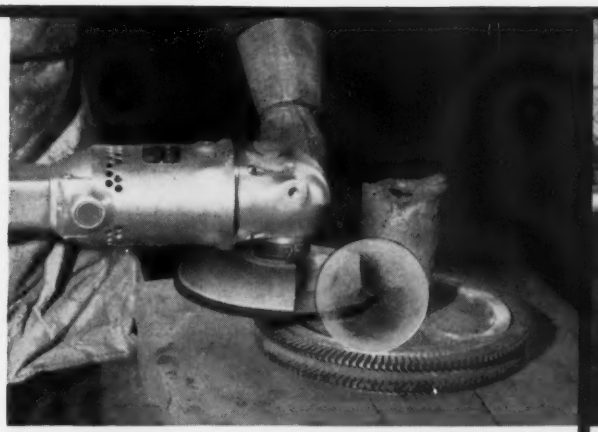
The BIG 5 in Reinforced Wheels

RN WHEELS — Glass Cloth

New — for the foundry and lower priced! Norton has been field-testing a new rubber-bonded-reinforced wheel. It's ready now and well worth your investigation for savings in your cutting-off operations on ferrous and non-ferrous metals.

BN WHEELS — Glass Cloth

Ten inch diameter wheels can now be had 1/16" and 3/32" thick. In this range specify A36TBN. For heavy duty work, requiring larger and thicker wheels, specify A24R14BN. Use them for slotting, for cutting-off non-ferrous metals, wire rope, many non-metallic materials.



BD WHEELS — Glass-Nylon

For fastest cutting on right-angle grinders you'll want the glass cloth reinforced resinoid bonded hub wheels of rigid type. Use for medium to heavy weld grinding and smoothing flame-cut edges. Specify A24NBD for fast cut, A24QBD for long life. For cutting-off, A24RBD which is Nylon reinforced.

BFR WHEELS — Cotton-Nylon

Top performers for light, portable grinding. These semi-flexible resinoid wheels have cotton fabric with an additional layer of Nylon for added safety. Specify A24KBFR for weld smoothing, removing scale, light finishing, minor cut-off jobs, etc.

Norton Reinforced Wheels are built in many different varieties . . . to add the "TOUCH OF GOLD" in many different ways

There's no limit to what the complete line of Norton reinforced wheels can do for you, in the widest range of everyday grinding jobs — from light deburring to heavy cutting-off.

That's because each type combines exactly the right abrasive, reinforcing web and bond to assure exceptional strength and safety — plus fast, cool, trouble-free performance. Remember: only Norton offers you such long experience in both grinding wheels and grinding machines . . . which means these particular wheels are sure to bring you the money-saving, value-adding "Touch of Gold" on job after day, day after day.

Also, Reinforced Mounted Wheels and Sticks are available. Here we show just five of the popular reinforced wheel types. For plenty of further facts, read our Booklet No. 1748. Get it from your Norton distributor — together with fast, helpful service. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

BF WHEELS — Cotton

These resinoid straight wheels with cotton fabric reinforcement are "the right combination" for peripheral grinding, do a fine job of deburring and finishing. Fine for blending and smoothing light welds. Also available in mounted wheels and sticks.

W-1814 A

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This American Monorail installation is typical of hundreds which have sharply cut handling costs.

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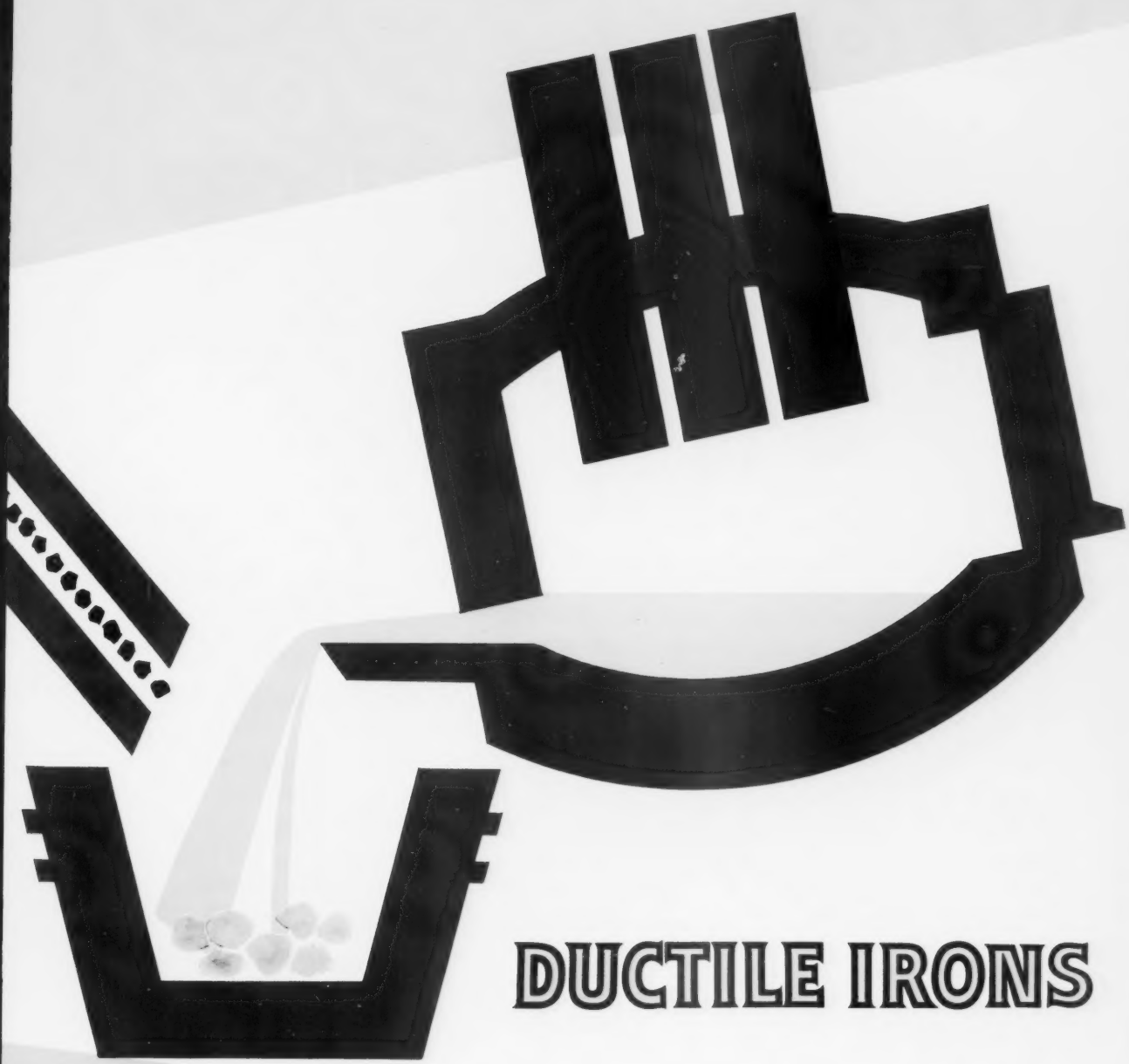
Circle 606 on Inquiry Card→

Oct. 1957 Vol. 4 No. 3

NATIONAL CARBON COMPANY'S

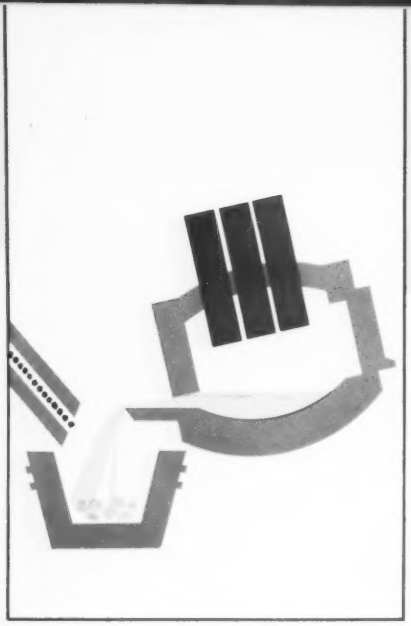
CARBON AND GRAPHITE NEWS



DUCTILE IRONS

a new family of metals for industry

opyright 1957, Union Carbide Corporation



ANOTHER ELECTRIC

Today, many foundries are close metallurgical control

DUCTILE IRONS

This relatively new family of cast metals has proved the most outstanding foundry development since malleable iron.

Today, industry has available to it a relatively new material known as ductile irons. Unlike ordinary cast iron, ductile irons can be bent, twisted, drawn or otherwise deformed without fracturing. These ductile irons, to a large degree, bridge the gap which long existed between cast iron and steel.

Ductile irons have the processing advantages of cast iron — good fluidity and castability, ready machinability and low melting point — combined with many of the engineering advantages of steel — good strength, toughness, heat resistance and substantial ductility. Ductile iron has several times the strength of ordinary gray iron, exceptional resistance to impact shock and excellent resistance to oxidation and growth at elevated temperatures.

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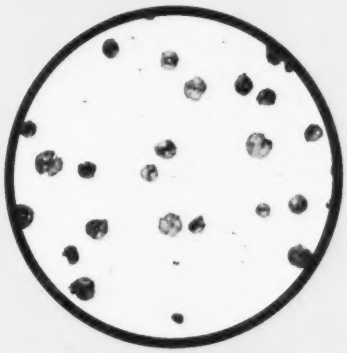
FURNACE PRODUCT...

using the electric arc furnace to achieve the and critical analyses needed for ductile iron.

UNIQUE GRAPHITIC STRUCTURE

Gray iron — random graphite flakes, unetched, magnification 100 X.



Ductile iron — random graphite spheroids, unetched, magnification 100 X.

Ductile iron is cast iron in which graphite is present as spheres or spheroids of characteristic structure, in contrast to the flake graphite in gray iron or compacted aggregates which distinguish malleable iron. Ductile iron is also known as nodular iron, nodular graphite iron, spherulitic iron, spheroidal graphite iron and SG iron.

The total carbon content of ductile iron is the same as that of gray iron. Spherulitic graphite particles are formed during solidification by the addition of a very small percentage of magnesium in the molten metal prior to casting. The startling change in the microstructure achieved by causing the graphite to take a spheroidal shape removes the former weakening and embrittling effects. The graphite now is in a shape which presents the minimum number of surface discontinuities in the surrounding metal, and a far stronger, tougher and ductile material is attained.

ADVERTISEMENT

DUCTILE IRON SPECIFICATIONS

There are four specifications covering grades of ductile irons as set up by the ASTM. They are designated as 60-45-10, 80-60-03, 100-70-03 and 120-90-02. The numbers refer, respectively, to minimum tensile strength in 1,000 psi, minimum yield strength in 1,000 psi, and minimum elongation on percent. These specifications are summarized in Table 1.

Type	Typical Range of Mechanical Properties					Specifications
	Tensile Strength psi	Yield Strength psi	Elongation %	Hardness Brinell	Charpy Impact Unnotched (Ft.-Lbs.)	
60-45-10	60/80,000	45/60,000	10/25	140/200	60/115	ASTM A339-55 MIL-I-11466 (ORD.) MIL-I-17166 (SHIPS) (1) AMS #5315 (2) ASTM A395-55T (3)
	(1) Requires 40,000 psi yield and 15% elongation, also specific chemical composition and metallurgical structure. (2) Requires 15% min. elongation. (3) Requires 15% min. elongation, also specific chemical composition and other casting specifications.					
80-60-03	80/100,000	60/75,000	3/10	200/270	15/65	ASTM A339-55 MIL-I-11466 (ORD.) AMS #5316
100-70-03	100/120,000	70/90,000	3/10	240/300	35/50	MIL-I-11466 (ORD.) (4) ASTM A-396-55T
	(4) Requires 75,000 psi yield and 4% elongation.					
120-90-02	120/150,000	90/125,000	2/7	270/350	25/40	MIL-I-11466 (ORD.) ASTM A-396-55T
Heat Resistant (5)	60/100,000	45/75,000	0/20	140/300	5/115	
	(5) Typical composition range: T.C. 2.8/3.8%, Si 2.5/6.0%, Mn .20/.60%, P .10% max., Ni 0/1.5%. Although resistance to oxidation increases with silicon content and is excellent at 6% Si, most castings are purchased at 3.0/4.5% Si which provides the best compromise between mechanical properties and oxidation resistance. This grade is not recommended for applications involving severe thermal shock.					
High Alloy	54/74,000	32/38,000	4/40	140/200	*Vee Notched* 10 to 28	MIL-I-18397 (SHIPS) AMS #5394

PRODUCTION METHODS

Ductile iron may be produced in the electric arc furnace, acid cupola, basic cupola, carbon lined (neutral) cupola or by duplexing from cupola to the electric arc furnace.

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ELECTRIC ARC FURNACE

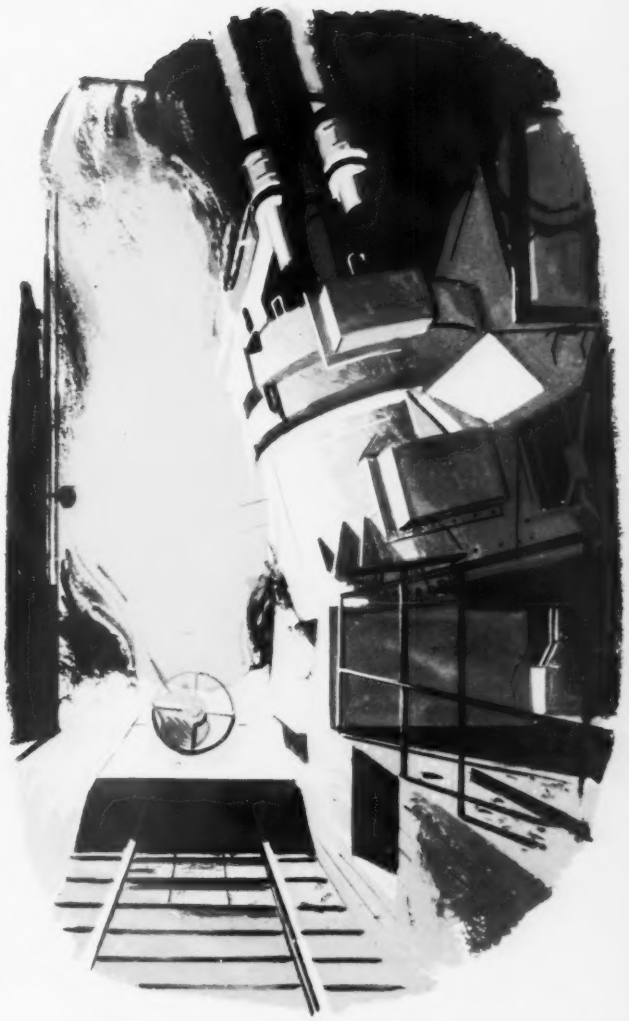
Because of the need for close metallurgical control and high purity analysis of the cast iron used as a base for ductile irons, a substantial number of foundries are now using the electric arc furnace for the same reasons that high quality steels have been made in this type furnace from the beginning.

It has been estimated that approximately one-third of the foundries making ductile irons are using electric furnaces in their operations.

It is now well established that, regardless of analysis, the ease of controlling slag-metal reactions and bath temperatures in the electric furnace make it an ideal tool for the production of close analysis products. The electric furnace not only provides for close chemical reduction and control but there is no further contamination of the bath because the "fuel" – electricity – contains no sulphur or other impurities.

Many foundries making precision ductile iron castings are employing the exceptional control features of the electric furnace in their operations. For example, there is great demand today for the electric furnace in producing Austenitic ductile irons, because, there are more alloys to control and pouring temperatures are more critical.

Some foundries practice duplexing in the electric furnace in conjunction with cupolas. As one foundryman stated, "It's the electric furnace hands-down for this operation." Any attempt to utilize oil or coal-fired holding furnaces would produce too much sulphur in the base metal.



A foundry manager, commenting on the electric furnace for producing ductile iron said, "It's wonderful . . . you can turn it on and off quickly and make up large or small heats as needed."

ACID OR BASIC CUPOLA

Through the years the conventional cupola with an acid lining has been operated purely as a melting furnace with no great chemical refinement expected. Cumulative sulphur absorption and declining raw material quality have made it increasingly difficult to meet the rigid and varied metallurgical specifications with the materials available and the chemical limitations of the acid cupola. The metallurgical requirements of ductile iron present a good example; with a magnesium addition, the final sulphur content of ductile iron will normally be below 0.020 per cent.

In the basic cupola, irons of 0.010 per cent sulphur and 3.90 per cent carbon are not uncommon. This iron requires approximately two-thirds the magnesium alloy addition usually needed for acid cupola iron. From the economic and metallurgical standpoint the basic cupola seems to offer more definite advantages than acid lined cupolas.

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Look Ahead—
Look Electric

Gives greatest flexibility—
Makes any steel—any time—from stainless to plain carbon. Handles cold scrap, metallics, hot metal. Starts, stops quickly — gives faster melts.

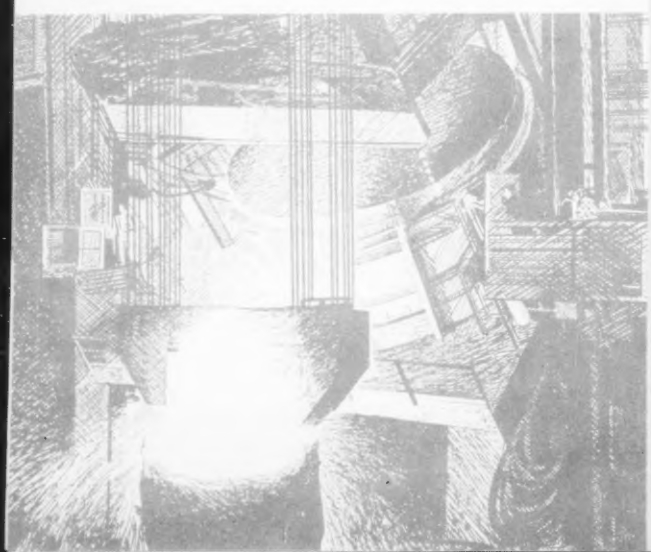
Delivers highest quality product—
Closer temperature control possible.

Lowers capital investment—
40% less than equivalent open-hearth capacity.

Saves space—
Savings of 25% and more vs. open hearths producing same tonnage.

Goes up fast—
Capital investment pays off sooner.

Uses clean fuel—electricity—
No combustion products to contaminate melt.



CARBON LINED CUPOLAS

Cupolas having carbon linings in the well area have proven superior in the production of ductile irons with respect to lining life and maintenance costs, and also assure close chemical and metallurgical control as required. The first installations of carbon linings were made by companies operating basic cupolas which had experienced high refractory costs due to the corrosive action of the basic slag. Full advantage has been taken of the high corrosion-resistant and chemically neutral properties of carbon. There are many cupolas operating in the United States today with "National" Carbon linings.

PRODUCTION TECHNIQUES

Due to the excellent fluidity characteristics of ductile iron in the molten state, thin sections cast as easily as thick sections. If thin section castings are desired, a charge of 100% pig iron will cast exceptionally well. But, the high carbon content of this molten metal (3.8 to 4.0%) will cause carbon flotation when cast in thick sections. Therefore, if thick section castings are on production schedules, operations will proceed much smoother when the charge is calculated to reduce carbon content of the base material to roughly 3.5 to 3.8 per cent. This can be accomplished by adding steel to the charge or better still, by employing the revert (gates and risers) from previous ductile iron castings, adding steel, and utilizing a carbon raiser in pellet form.

From tap-out to casting the process for ductile iron is similar regardless of the charge. The base metal is tapped into a ladle containing a magnesium alloy to provide a sufficient amount of retained magnesium necessary to promote spheroidal graphite. The bath is then inoculated with ferro-silicon to eliminate carbide and to insure metal will be graphitic when cast.

One source recommends that ductile base metal in the electric furnace should be heated to a minimum of 2850°F and held for ten minutes prior to tapping. It is easy to maintain close control at these temperatures in the electric furnace. This will assure a metal free of flake graphite and eliminate the risk of a poor heat.

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CASTING AND FINISHING CHARACTERISTICS

Ductile iron is similar to soft, high carbon cast iron in that it has a low melting point and good fluidity in the molten state. Because of these characteristics it can be cast in intricate shapes and thin-sectioned parts. For example, the metal will flow several inches in sections as small as 1/16 in. in green sand molds at normal foundry pouring temperatures. Castings weighing but a few ounces contrast with others weighing as much as 50 tons to further verify the versatility of this new group of metals.

The machinability of ductile iron is superior to that of gray iron having the same hardness, with a considerable decrease in tearing. The millions of minute nodules of graphite provide a factor of self-lubrication which prevents galling and scuffing. It can be machined about twice as fast as steel at a considerably lower power requirement.

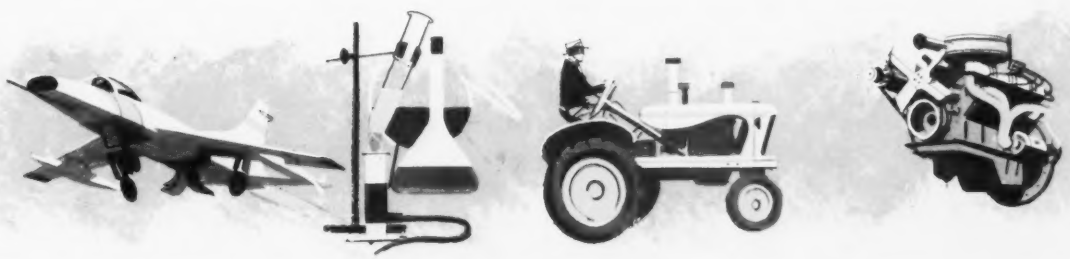
This new metal can be heat treated as readily and satisfactorily as steel. It can be softened by annealing or hardened by normalizing or oil quenching and tempering. Stress relieving of complex castings is a regular practice, while flame or induction hardening is accomplished without using special procedures, for all types except the high alloy types.

Ductile iron can be welded to itself and to other metals such as carbon steel, stainless steel, and nickel, using the same techniques as applied to good grades of gray iron. The material can also be brazed with silver or copper brazing alloys.

DUCTILE IRON APPLICATIONS

The characteristics of these irons suggest five general uses:

1. **Where greater strength or resistance to impact is needed than can be obtained with conventional cast irons.**
2. **For large castings which have been difficult to cast in malleable iron.**
3. **For replacing steel castings where higher yield strength, cost and machinability are factors.**
4. **Heat-resisting applications because of greater resistance to growth and high strength at elevated temperatures.**
5. **Pressure castings where close grain structure at low cost is a must.**



It is obvious that this development will extend the use of iron in the aeronautical, agricultural, automotive and diesel, cement, chemical processing, electrical, glass, heavy machinery, marine, mining, paper and pulp, petroleum, steel mill, tool and die, and many other industries.

The increasing use of this relatively new metal type is best proved by production figures showing that tonnages have increased approximately 100 percent in the past year.

ADVERTISEMENT

The following listing represents most of the foundries now producing ductile iron in the electric arc furnace:

Centrifugal Casting Co., Long Beach, California
Stanley Foundries, Huntington Park, California
Farrell-Birmingham Co., Ansonia, Connecticut
Soundcast Co., Newport Beach, California
Howard Foundry Co., Chicago, Illinois
Sioux City Foundry & Boiler Co., Sioux City, Iowa
Crompton & Knowles Corp., Worcester, Massachusetts
Hunt-Spiller Mfg. Corp., Boston, Massachusetts
Baker Perkins, Inc., Saginaw, Michigan
Century Electric Co., St. Louis, Missouri
American Brake Shoe Co., Rochester, New York
Sterling Foundry Co., Wellington, Ohio
Textile Machine Works, Reading, Pennsylvania
Treadwell Engineering Co., Easton, Pennsylvania
Westinghouse Air Brake Co., Wilmerdin, Pennsylvania
Westinghouse Electric Corp., Trafford, Pennsylvania
Standard Brass & Mfg. Co., Port Arthur, Texas
Fairbanks Morse & Co., Beloit, Wisconsin
Brown & Sharpe Mfg. Co., Providence, Rhode Island
Borg Warner Corp., York Division, York, Pennsylvania
Chapman Valve Co., Indian Orchard, Massachusetts
Clark Equipment Co., Buchanan, Michigan
Gleason Works, Rochester, New York
Ingersoll Rand Corp., Phillipsburg, Pennsylvania
Engineering Castings Corp., Marshall, Michigan
Janney Cylinder Co., Philadelphia, Pennsylvania
Jeffrey Mfg. Co., Columbus, Ohio
Kiekhaefer Aeromarine Motors, Inc., Fond du Lac, Wisconsin
Koppers Co., Baltimore, Maryland
Penberthy Mfg. Co., Detroit, Michigan
Scott Castings Corp., Buffalo, New York
Thomas Foundries, Birmingham, Alabama
U. S. Pipe Co., Burlington, New Jersey
Wells Mfg. Co., Skokee, Illinois
Grede Foundries, Inc., Milwaukee, Wisconsin

SUMMING UP

That the uses of ductile irons are rapidly expanding there is no doubt. While it is difficult to approximate its economic impact on the producing and utilizing industries, its overall importance is now well established. There remains only a development of metallurgical refinements and production means and methods to assure its status as an equal member in our ever growing family of metals. For example, experimental work started in this country in September 1957, for adding pure magnesium to the base metal in sealed ladles. This technique . . . as well as other experimental work under way or presently planned – may point the way to greater economies in the manufacture of ductile iron.

The terms "National" and "Union Carbide" are registered trade-marks of Union Carbide Corporation
NATIONAL CARBON COMPANY
Division of Union Carbide Corporation • 30 East 42nd Street, New York 17, N. Y.
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UNION CARBIDE
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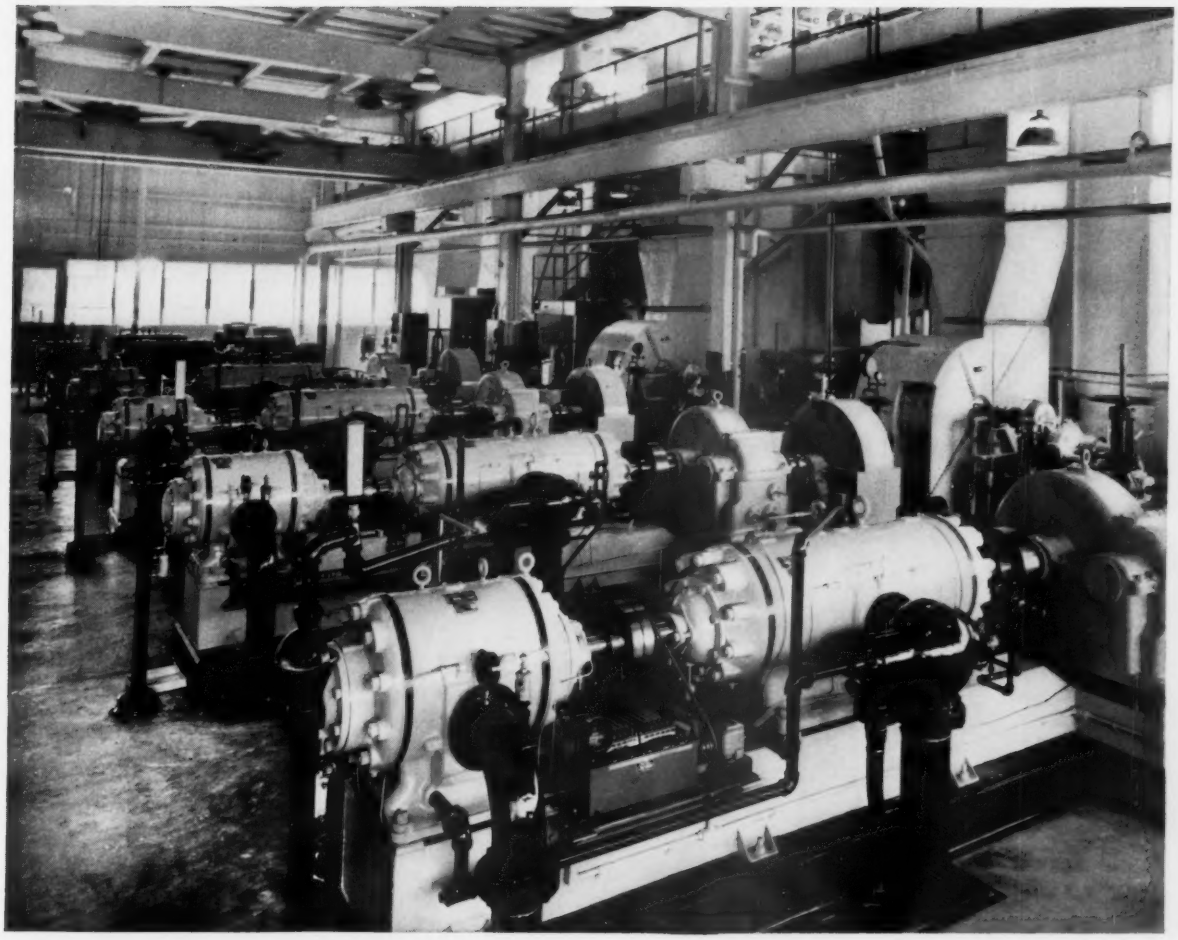


4 YEARS - - 25,000 HOURS OPERATING PERFORMANCE!

This is just one of many production records set by Fuller Rotary Compressors—in this case by each of six machines installed in a leading aircraft plant. The only maintenance or replacement necessary over this period was installation of high and low pressure blades. Bearings held up 100%.

Fuller rotary compressors shown are four C-300-300H, steam turbine drive, capacity each 1248 to 1805 c.f.m., with speed ranges of 450 to 650 r.p.m., 125-lb. gauge pressure, and two electric motor drive, capacity each 1663 c.f.m., at 600 r.p.m., 110 lb. gauge pressure.

Your plant, too, can take advantage of the many cost-saving advantages of Fuller rotary compressors; such as smooth airflow, lack of vibration minimum of moving parts, adaptability to any production setup, and the advantage of "one man" operation.

Write today to Fuller Company and get complete data on how Fuller rotary compressors can give you more air power at less cost.

Fuller

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY C-312 4659

148 Bridge St., Catasauqua, Pa.

SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

Birmingham · Chicago · Kansas City · Los Angeles · San Francisco · Seattle

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

They're Pouring Strength, Machinability,

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Wear-Resistance with CHATEAUGAY PIG IRON

East Akron Casting Company, Tallmadge, Ohio, has built a solid reputation as a jobbing foundry by using Chateaugay Pig Iron. They have found from over 70 years' experience, that there is no better nor more economical means for providing their customers with strong, flaw-free, easy-to-machine castings.

The wire drawing drum, shown left, is typical of the quality castings produced by the company. Requirements on this particular job call for unusual strength, a high degree of machinability, and maximum resistance to wear. Chateaugay fills the bill on every count.

Chateaugay Pig Iron is produced at Troy, New York, entirely from New York State ores. Its properties and characteristics are unequalled by any domestic pig iron. It is a low-phosphorus, copper-free iron. The highly uniform distribution of chemical elements produces a fine, dense grain structure throughout every casting. This results in excellent and economical machining—plus exceptionally high strength and wear-resistance.

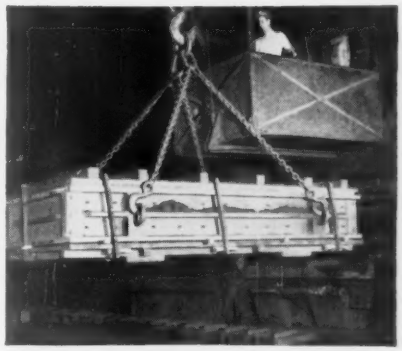
Chateaugay's other superior characteristics make it ideal for a wide variety of applications. It flows freely—fills adjoining light and heavy sections completely—cools evenly. A very high carbon, and unusually low sulphur, phosphorus, and manganese content make it the perfect iron for ductile use.

A Republic Pig Iron Metallurgist will give you the full story about Chateaugay and other Republic Irons. Republic, as the only producer of both Northern and Southern Irons, offers industry's only complete line of all grades of merchant pig irons. Northern grades include Malleable, Bessemer, Foundry, and Basic. Southern furnaces produce Foundry and Basic Irons.

Mail the coupon for metallurgical service and for more information on Republic's complete line of irons.

STRONG, HEAVY-DUTY PB-127 COLLAPSIBLE BOX AND SKID UNITS help solve a costly handling problem. Incoming shipments are handled up to 10 times as fast. Storage space requirements are reduced 66%. Units can be tiered loaded or empty—collapsed or set up. Collapsible feature reduces transportation costs. One-piece design. All parts permanently attached. Write for details.

STRENGTH MEANS SAFETY when you specify Republic Alloy Chain Slings for handling heavy flasks and castings. High strength-to-weight ratio of Republic Alloy Chain means smaller and lighter slings for heavier loads. Send coupon for facts.



STEEL
and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-4562
3132 EAST 45TH STREET • CLEVELAND 27, OHIO

☐ Have a Pig Iron Metallurgist call.
Send more information on:
☐ Chateaugay ☐ Northern Pig Irons ☐ Southern Pig Irons
☐ PB-127 Collapsible Boxes ☐ Alloy Chain Slings

Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____

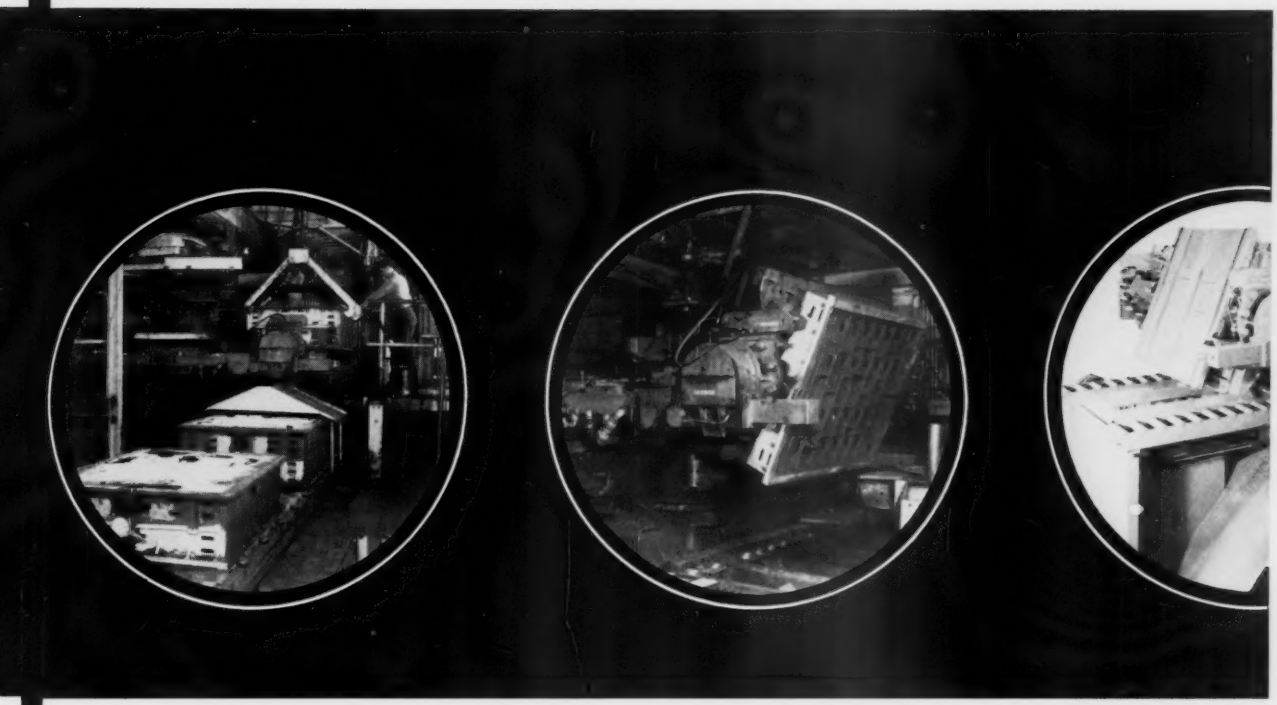
Circle 608 on Inquiry Card—Page 51

eighth in a series . . . the automatic two-station indexing machine

why foundrymen buy a HERMAN molding machine

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

FEMA



✻PUSHBUTTON MOLDING

Increasing numbers of foundrymen are turning to this revolutionary Herman machine for good reasons. Basically, it is the most practical answer to a need for fast, consistent production.

It makes pushbutton molding a reality. One unit, for example, is turning out molds at a rate faster than one a minute. This production is constant, because the equipment operates on an automatic cycle which follows a definite timed sequence.

Control is maintained from a central panel board where it is possible to interrupt the automatic cycle at any time, if necessary.

The Herman Automatic Indexing Machine, in the particular installation shown, is producing couplers and other railroad car castings, but it is a flexible unit well able to produce a wide variety of other types and sizes.

Uniform molds, true-to-dimension production, and high speed make it an unbeatable machine.

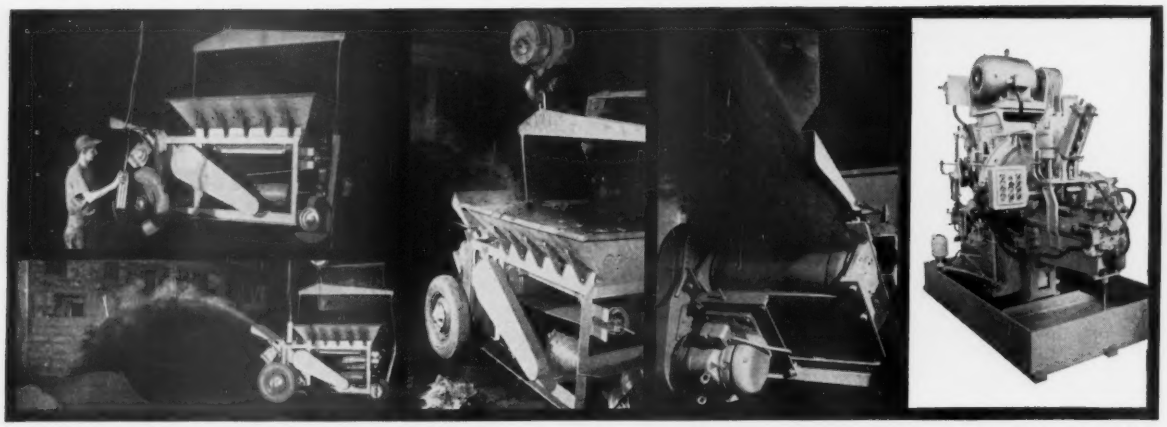
We would like an opportunity to tell you, in more detail, how this particular Herman would fit into your foundry.

There is a type and size Herman Molding Machine for all foundry operations.

HERMAN

Best Known Name in Molding Machines

Circle 609 on Inquiry Card—Page 51



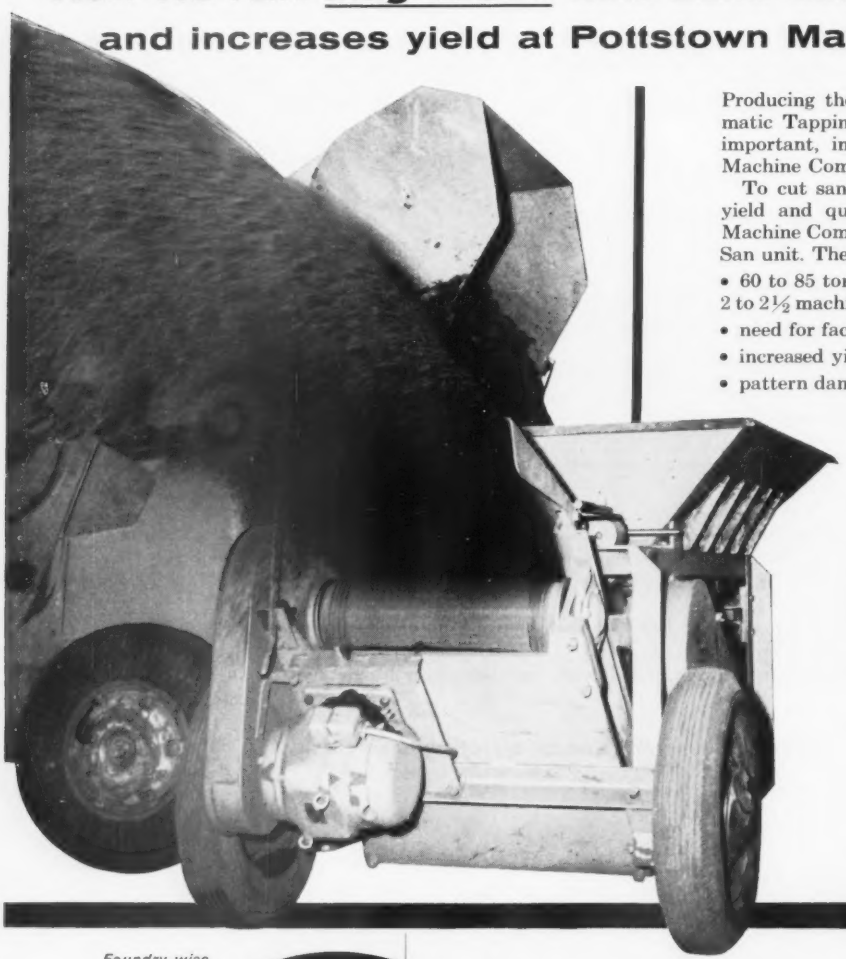
(Upper) Compact—Highly Portable . . . 60" x 90" size fits it into any layout . . . turns on 6½ foot radius . . . handy yoke hitch for crane moving.
(Lower) At Pottstown, Magna-San flanks each molding station with 20-foot windrow of cooled, perfectly conditioned sand.

15 cu. ft. hopper can be fed from three sides, as fast as a front end loader can be positioned. Note hopper grate to "hold up" large sprues, spills, etc.

Handling a very heavy sand at Pottstown, note fluffy, clean, thoroughly-aerated discharge. Rugged construction is typical of Royer.

End Result—a high-quality precision tool—Pottstown's internationally-known Automatic Tapping and Threading Machines for pipe fittings, valves, etc.

How ROYER Magna-San cuts sand conditioning costs and increases yield at Pottstown Machine Company



Producing the castings for their famous Automatic Tapping and Threading Machines is an important, integrated operation at Pottstown Machine Company.

To cut sand conditioning costs and increase yield and quality of castings, the Pottstown Machine Company chose the *new* Royer Magna-San unit. Their experience:

- 60 to 85 tons of sand perfectly conditioned in 2 to 2½ machine hours . . . only 4 to 5 man hours
- need for facing sand cut more than 50%
- increased yield of finest quality castings
- pattern damage cut to rock bottom
- a *new method* that makes entire foundry operation more clean-cut and straightforward

Magna-San magnetically cleans, mixes, blends and aerates up to 45 tons of sand per hour—at a lower initial cost and much less upkeep than any other mechanical method. Investigate this valuable addition to the facilities of *your* foundry—be it large or small. Write for detailed literature and the name of the service-minded Royer agent in your area.

Foundry-wise agents throughout the U.S. and Canada

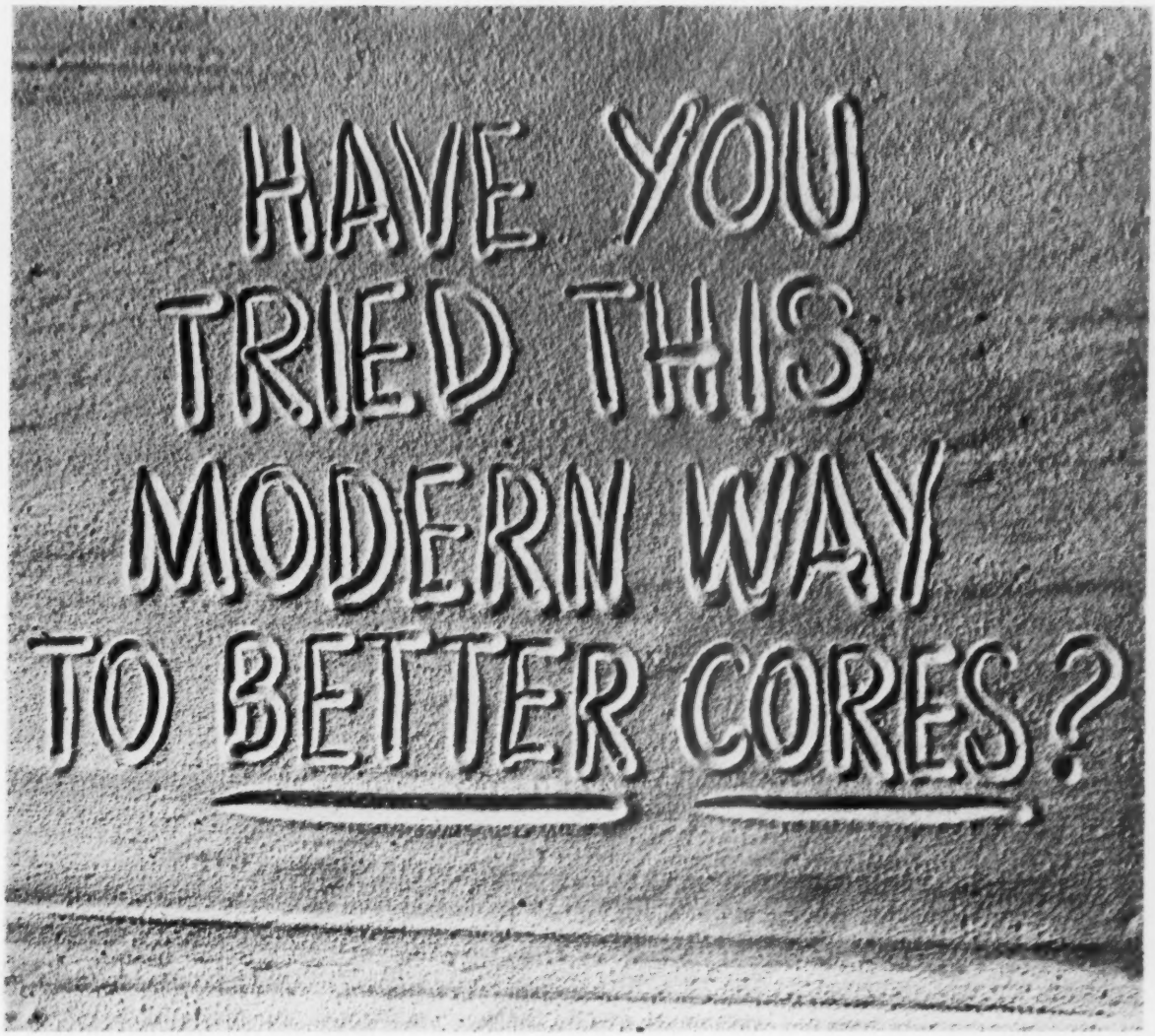
EXPORT DEPT.
10406 South Western Ave.
Chicago 43, Ill.

ROYER

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE STREET / KINGSTON, PENNA.

FOREMOST IN SAND CONDITIONING EQUIPMENT



It's Houghton's HY-TEN QUIK-SETT . . . the last word in cold setting core binders for large core making. Now, with this unique product, you can get the finest, fastest cores you have ever made, at lower cost. No complicated mix, just use clean, dry, clay-free sand, QUIK-SETT binder and QUIK-SETT accelerator.

And it's easy. Forget the ramming. Don't worry about dimensional changes. Just pack that treated sand right into the core box and let QUIK-SETT take over. Now baking takes just half the time, and can't foul up sizes or edges. Overbaking is no problem.

You'll find the finish finer, the surface smoother. For QUIK-SETT cores are strong, supple. They stand up well to the shock of molten metal. Still they shake out quick and clean.

Get full information on the modern, economical way to better cores. Call in your Houghton man. Or write to E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

HY-TEN QUIK-SETT

. . . a product of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Circle 611 on Inquiry Card—Page 51

with the *Exclusive*

fine FANNER FAN-S-CHILLS

provide superior chilling and greater savings

A triumph of modern research and engineering — the FAN-S-CHILL, through its curved "S" design, provides 75% more chilling surface since there is no solid mass.

Exclusive design with its perforated surface and double channel permits maximum parent metal fill-in . . . fuses into cast metal solidly, completely . . assures better quality castings.

Formed steel fabrication provides highest possible chilling efficiency . . . ideal for general chilling purposes . . . especially in steel.

Lightweight construction provides triple savings — in cost, in shipping and in handling.

Get the facts on the many cost saving features of the fine FANNER FAN-S-CHILL . . . write today for samples and latest prices.

SPECIFICATIONS:

WIDTH: ⅜" — ⅝" — ¾" — 1" — 1 ¼."

LENGTH: ½" to 5"

Made in heavy, medium and light gauges.

Copper, aluminum or tin coated.

Lighter or heavier FAN-S-CHILLS in special sizes can be made on request.

ENGINEERING SERVICE:

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of FINE FANNER CHAPLETS AND CHILLS

BROOKSIDE PARK CLEVELAND 9, OHIO

CURVED "S" DESIGN

LIGHTWEIGHT

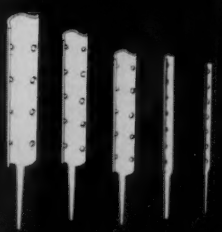
Savings in cost. Lower shipping charges. Easier to handle on the job.

GREATER FUSION

No pockets to trap gases. Perforations permit metal flow-through. So completely fused, difficult to detect even with X-ray.

GREATER CHILLING SURFACE

75% greater chilling area since there is no solid mass — produces better castings.



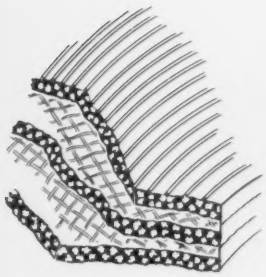
5 STANDARD SIZES

The ideal chill for a wide range of applications. A size for every need — eliminates makeshift chilling.

NEW CUT-OFF WHEEL

AVERAGES 33% LONGER LIFE!

The records being set for all-round cutting efficiency by Bay State's new BZ2AA cut-off wheel are the results of careful and continuous research.



Cut-away wheel section showing reinforcement between layers of bonded abrasive.

Modern cut-off operations involve tremendous speeds, pressures and temperatures. If one of the three major cut-off wheel components . . . abrasive, bond or reinforcement . . . wears at a different rate from the others, cutting efficiency and wheel life fall off drastically. In the BZ2AA, Bay State has developed a new method of controlling these wear rates through the use of an improved bond. Now the three components are more perfectly matched, resulting in peak grinding efficiency.

In controlled laboratory tests the new BZ2AA wheel lasted an average 33% longer than the runner-up, Bay State's BZ2. Below are results of two such tests. They are typical of hundreds which have been confirmed in cutting gates and risers in leading foundries across the country.

Test #104 — Dry cutting cold rolled steel 1" square.
Wheel size: 16 x ⅛ x 1

	No. of cuts per wheel	
	BZ2	BZ2AA
	156	228
	157	193
	161	210
Total cuts	474	631
Average	158	210

Result: 33% more cuts per wheel with BZ2AA

Test #210 — Dry cutting cold rolled steel 1½" round.
Wheel size: 16 x ⅛ x 1

	No. of cuts per wheel	
	BZ2	BZ2AA
	58	71
	57	82
Total cuts	115	153
Average	57.5	76.5

Result: 33% more cuts per wheel with BZ2AA

The best proof of the BZ2AA's superiority is a test in your own cleaning room. Your Bay State representative will welcome the opportunity to arrange for such a test.

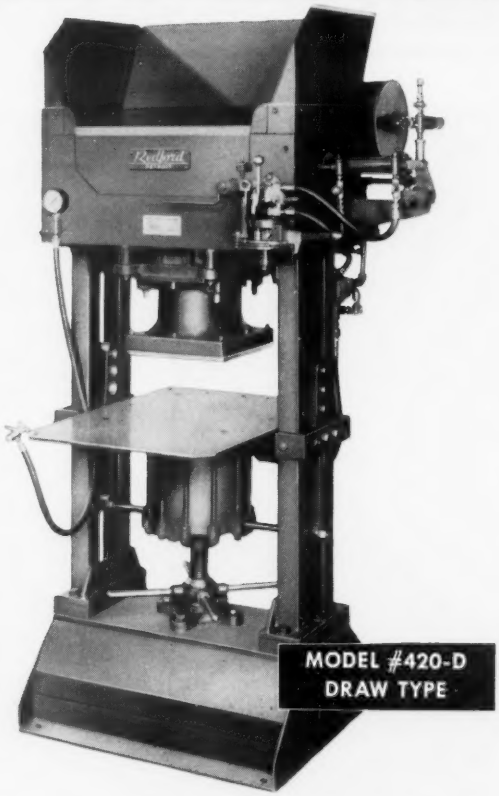
Write for descriptive sheet with full information.

BAY STATE ABRASIVES

BAY STATE
WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Mass.
Branch Offices and Warehouses: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh.
Distributors: All principal cities. Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario.

Circle 614 on Inquiry Card—Page 51



Redford

CORE BLOWER AND CORE SHOOTER

Here is a core making machine that is setting new standards in versatility and performance. The #420 Redford is equipped *to make cores up to 20 lbs. using any type binder.* Proven core blowing practices may be continued to do the most intricate work and to assure maximum production. Tough sand mixes which do not readily lend themselves to blowing can be used in ramming or shooting cores.

Core shooting requires a fast acting machine having sufficient capacity to propel sand at high velocity through a large shoot head opening. The large shoot head opening offers little resistance to the flow of sand and allows any sand to be rammed into suitable open cavity core boxes ahead of the propelling air.

With the #420 Redford we offer a tool that allows you the widest choice of application. It is a properly balanced combination of standard Redford practices that makes possible a low cost machine of greater usefulness and versatility to meet today's core room requirements.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

For Complete Information write for
BULLETIN #42

For High Quality DUCTILE IRON CASTINGS...

Specify NEVILLE ILP PIG IRON

IF YOU produce or plan to produce ductile iron castings, you'll be interested in these important facts about Neville ILP (Intermediate Low Phosphorus) Pig Iron.

1. Neville ILP Pig Iron is manufactured by a merchant producer from *selected* raw materials.
2. It is a uniform, high quality iron with a controlled *minimum* of subversives.
3. It is produced and stockpiled within very close silicon ranges, and with sulphur, phosphorus and manganese content well below maximum limits specified by industry standards.
4. It is regularly used for the production of ductile iron castings by many of the nation's leading captive and jobbing foundries. (Names upon request.)

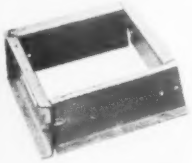
You'll discover that Neville ILP Pig Iron can meet the requirement of *any* ductile iron casting you make. And there's a good chance you'll be able to realize appreciable cost savings through its use!

Write or call today for more information about Neville ILP Pig Iron. Our technical service department will be glad to assist you in your application problems.

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

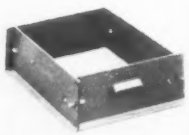
Circle 616 on Inquiry Card—Page 51

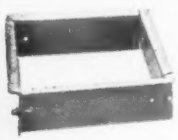
DO YOU KNOW?
The ONLY complete line of
ADJUSTABLE
and
SELF ALIGNING
Slip Jackets
is manufactured by
Products Engineering Co.
Cape Girardeau, Mo.
Pats. Pend.



Type I
3/16" Steel
"Eliminate Shifts"

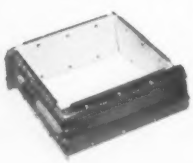
Type II
¼" Steel
"Reduce Crushes"

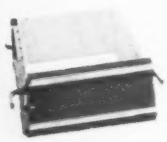




Type III
¼" Steel
"Fewer Run-outs"

Type IV
10 Gauge Steel
¼" Transite
"Less Maintenance"





Type V
3/16" Steel
½" Transite
"Lower Costs"

- The only jacket which is adjustable to fit different size molds—just drill more holes for more sizes.
- The jacket is self-aligning with controlled flexibility.
- All sides are replaceable and can be interchanged with others.
- Transite liners are easily replaced with stove bolts.
- Metal catching lugs have been eliminated so the jacket operates longer. Maintenance is easy as this is the only flexible jacket whose sides will lie flat.

For additional information write—

Products Engineering Co.
Cape Girardeau, Mo.

Name _____
Company _____
Address _____
City-Zone-State _____

Circle 617 on Inquiry Card—Page 51

Readers' Comment

Removing CO_2 Cores

TO THE EDITORS:

I noted in your column, "Trouble Shooting" appearing in the July issue of FOUNDRY a reference to difficulty in removing CO_2 processed cores from certain castings. I believe that "Sam" will find the water glass and sugar binder quite soluble in water—at least we did and had no difficulty removing a large diameter core through a very restricted opening when we just dumped the casting in a barrel of water and let it soak.

I guess you could now actually recover all of your core sand from the CO_2 process by just letting your old sand lie out in the back yard through the Spring Rains: Perhaps I'll try it sometime. What a natural for a slurry sand recovery and conveying system!

RAYMOND E. BIETRY,
President

B & S Bronze Foundry, Inc.
76 Sedgwick Street
Brooklyn 31, *N. Y.*

Birthday Congratulations

TO THE EDITORS:

Congratulations to your gang on your 65th birthday publication. You can all be proud of the fact that you have followed the standards of John A. Penton and have "a promise kept."

Of course, 65 years ago I knew little about anything relating to the FOUNDRY, but since I became associated with the foundry industry in 1920, I have seen the FOUNDRY magazine grow, develop and improve. Every issue seems to be more valuable than the previous issues, and for some reason or other you are able to make phenomenal improvement in every volume that comes in.

Congratulations to you all in this birthday month.

Our company will be 66 years old on Sept. 11, 1957, as it was founded Sept. 11, 1891.

PETER E. RENTSCHLER
President

Hamilton Foundry & Machine Co.
1551 Lincoln Ave.
Hamilton, Ohio

•

TO THE EDITORS:

Allow me to congratulate you on the 65th birthday of FOUNDRY magazine. I am quite sure that John Penton would be thoroughly satisfied and proud of the way you have maintained his ideals, as expressed in your current editorial.

I was very impressed with the lead article in the September issue, "A Design Engineer Looks at Casting Salesmen." The thorough analysis made by the writer, Mr. Ertsgaard, embodied all of the principles on which we have tried to gear our sales operations at Monarch. The big problem is to keep the salesmen constantly up to these standards with constant reminders on the complete scope of their work. With this in mind, I am wondering if you will be reprinting this article so that I could obtain ten copies for our staff.

Keep up the good work in the years ahead.

R. A. LAWSON
Vice President—Sales

Monarch Aluminum Mfg. Co.
Detroit Ave. at W. 93rd St.
Cleveland 2, *Ohio*

• Tearsheets of this and other feature articles are available to readers as long as the supply lasts—Ed.

What Bellmaking Takes

TO THE EDITORS:

We are still chuckling about the bell described in "Trouble Shooting" in your January issue.

Did Sam ever get the bell made and if so, what tone, if any, did it have?

At first we thought of helping you out a little by telling Sam that we know some people in Germany who have been casting steel bells for more than 100 years.

We refer to Bochumer Verein, whose founder, Jacob Mayer, made the first successful attempt at steel casting in 1841. In 1955 he was awarded the Gold Medal at the Paris exhibition of cast steel bells.

On second thought, we realized that we could not help you or Sam, because these German bellmakers found out long ago that there is more than just pouring steel to get the proper tone.

Perhaps if Sam's bronze did not turn out a bell that had any tone to it, he should try steel—though to save their souls, those Germans will not tell you what kind of steel they put into their bells, but they sure have beautiful tones.

HAROLD W. JONES
Vice President

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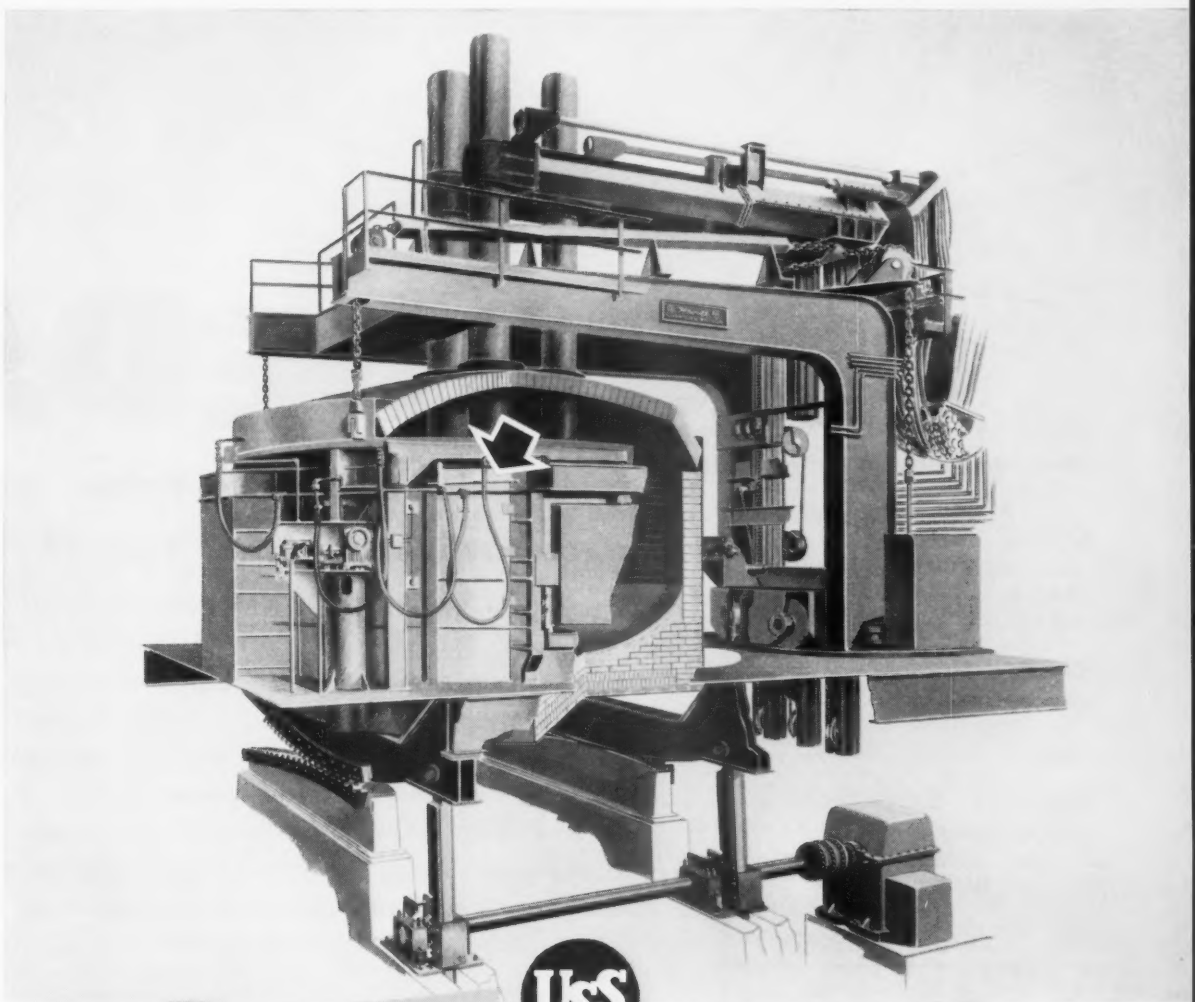
This cage-type shell construction is just one of the many advantages you get in the Heroult—advantages which make for performance efficiency, operating economy, and low-cost maintenance. Other exclusive features are: 100% mechanical operation; independently supported operating mechanism; flat bottom shell; and skew back roof ring.

The new Heroult Electric Melting Furnaces are available in sizes of shell diameter ranging from 7′ 0″ up, and with capacities of from 6,000 lbs. up to 400,000 lbs. and greater. They can readily be furnished with a non-magnetic shell bottom section to accommodate induction-stirring equipment. Gantry-type top-charge furnaces, door-charge furnaces, and special furnaces for duplexing and non-ferrous melting can also be supplied.

We welcome an opportunity to help you select and install the Heroult best suited to your requirements. An inquiry to the nearest office will bring complete details.



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PIONEERS IN THE MANUFACTURE OF FOUNDRY FLASKS

Staying in Business

Trends since World War II in the number of individual foundries have a significance matching that of the technical and operating developments during the same period. This fact is pointed up by the latest census of foundries just compiled by FOUNDRY from *Penton's Foundry List* and presented on Pages 108-109 of this issue.

Compared with 1955 totals, most changes in number of foundries in the United States and Canada show a continuation of trends prevailing for ten years. Extent of these changes is more pronounced if comparisons are made with figures of a decade ago.

For instance, today there are 25 per cent fewer gray iron foundries than in 1947. Decreases in numbers of other types of foundries are 17 per cent for malleable iron, 9 per cent for steel (excluding investment casting foundries), and 8 per cent for brass and bronze. On the other hand, aluminum foundries are 15 per cent more numerous, and 59 per cent more foundries are casting magnesium than in 1947.

This shrinkage in the gray iron foundry population is nothing new. Back in 1910, when it took the automobile industry an entire year to build as many cars as it now can turn out in one week, there were twice as many gray iron foundries in this country as there are today, although castings production, of course, was only a fraction of present levels.

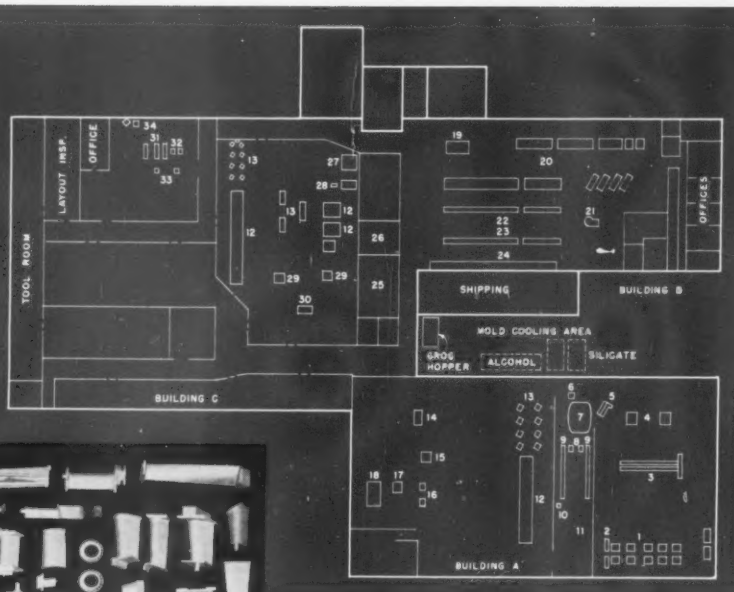
The reasons why several thousand gray iron foundries have closed during the last 47 years are many. A principal factor is the same one responsible for the eclipse of numerous small steel mills and automobile manufacturers—the lower unit costs inherent in large-scale production. Another important reason—and this applies to all types of manufacturing—is the failure to adopt improved production methods which will permit the individual company to remain competitive from a cost standpoint. A third reason has been the ineffectual selling job done by many foundries.

Growth in number of light metal foundries is a natural consequence of the broadening consumption of aluminum and magnesium. Shipments of all castings last year were 11 per cent larger than in 1947, but aluminum showed an 80 per cent gain and magnesium deliveries more than quadrupled. Today 54 per cent of all foundries produce aluminum castings—compared with 39 per cent for gray iron—but aluminum accounts for less than 3 per cent of all castings shipped.

The average aluminum foundry today is in somewhat the same position as its gray iron counterpart in 1910—it is a small shop. Whether its mortality record during coming years also will be comparable, despite future growth in consumption of aluminum castings, remains to be seen.

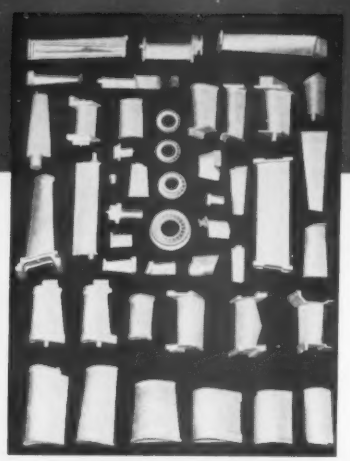
From the record of the past, however, it should be obvious that the chances for survival of any foundry will be primarily dependent on its ability to couple aggressive marketing with the high product quality and low costs which only the best production methods can develop.

William G. Guse
Managing Editor



1—Wax injection
2—Inspection
3—Wax assembly
4—Dip coat
5—Plate mounting
6—Sealing
7—Conveyor loop
8—Backing mixers
9—Vibratory conveyor
10—Mold cutoff
11—Mold storage
12—Preheat furnace
13—Metal melting & pouring
14—Vibratory shakeout
15—Table blast
16—Gate cutoff
17—Tumble blast
18—Salt bath
19—Inspection
20—Finishing
21—Sand blast
22—Inspection
23—Gaging
24—Zyglo
25—X-ray
26—Heat treat
27—Vacuum melting
28—Induction melting
29—Drying oven
30—Shakeout
31—Vacuum tables
32—Core tables
33—Sinks
34—Core blender

Plant is housed in three buildings and occupies an area of 75,000 sq ft, with 22,000 sq ft devoted to research and experimental operations



Principal product of the new foundry is high-alloy vanes for aircraft jet engines. They involve a wide variety of shapes and sizes

New Processes Used at

New Investment Casting Foundry

Centrifugal impeller core is made of ceramic material poured into a metal corebox in the Accra-Core process developed by the firm

At left in order are the drag, core, and cope for an impeller mold. Patterns for forming drag and cope appear in the foreground. Right shows the impeller and some other castings manufactured by the process

By EDWIN BREMER
Metallurgical Editor

New investment casting plant occupies an area of 75,000 sq ft. Of this total, 22,000 is devoted to research and experimental work, which has paid off to the company in the form of two new processes

CONTINUING growth of Misco Precision Casting Co., with facilities in Detroit and Whitehall, Mich., led to the recent building of a new foundry at Muskegon, Mich. It incorporates the latest in injection equipment, material handling, investment preparation, continuous investing and new controls.

The new plant occupies an area of 75,000 sq ft, of which 22,000 sq ft is devoted to research and experimental work. As indicated in the accompanying layout sketch, the several departments are housed in three adjoining buildings which for identification are designated A, B and C.

Raw materials for investments including grog, silica sand and silica flour, received in bags and palletized, are trucked from a railroad siding about ¼ mile away and dumped separately into a hopper outside of building A. From there these materials are transported pneumatically over the roof to elevated storage hoppers on the second floor of building A above the investment mixing equipment. Alcohol and ethyl silicate are stored in elevated tanks outside the building and pumped to mixing tanks also located on the second floor.

Vane Manufacture—Major product of the new foundry is high-alloy vanes for aircraft jet engines. Disposable patterns are made of wax produced in soft metal dies. This operation is performed on ten specially constructed wax injection machines designed by the firm's engineers. Machines are in two rows, with a conveyor belt between the rows. Wax at 140° F is injected into the dies at 500 to 1000 psi, depending on the intricacy and mass distribution of the pattern.

Patterns made by the operators are placed on the conveyor belt and carried to the end of the row where they are inspected and gaged. They are placed on trays, loaded onto racks and transported a short distance to the assembly department where they are joined to form clusters. Assembly is accomplished in jigs or fixtures to insure correct spacing during attachment of runners, gates and stiffeners or crossbars. Joining is accomplished by use of electrically heated soldering irons. Assembly is performed on two benches about 30 ft long with a belt conveyor between. Assembled clusters are placed on the belt, which carries them to the end where they are inspected and placed on racks for transportation to the dip coating department.

In that department the clusters are dipped in a thin slurry of controlled grain size refractory and ethyl silicate. After dipping, the operator sifts coarse silica sand or grog over the cluster to provide a tooth for good adhesion of the backing or secondary investment. Clusters are placed on racks and allowed to air dry from 8 to 24 hours.

After air drying, the clusters are placed, sprue down, on a steel plate and sealed there with hot wax. Then an alloy-steel flask lined with waterproof paper, which extends about 5 in. above the top, is centered over the cluster on the plate. As

Vacuum unit located in research and experimental department permits controlled melting and pouring

Relatively thin but rigid, refractory shell forms the mold in the firm's Mono-Shell process

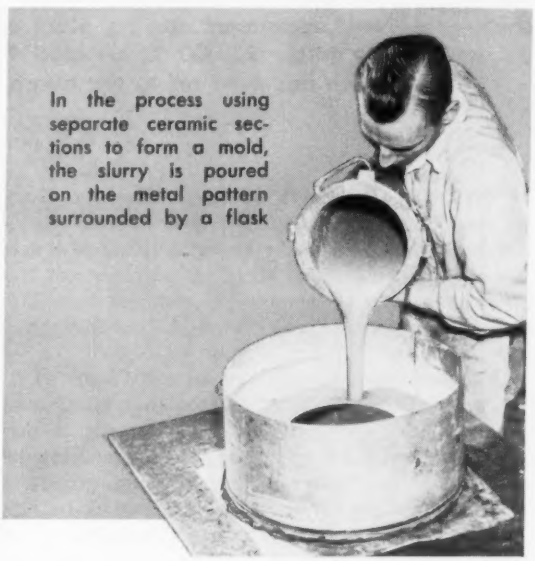
in the case of the cluster, the flask is sealed to the plate with hot wax. Plate and flask are placed on pallets on a chain conveyor loop and carried to the investing department.

Investment Mixing—Grog, silica sand and silica flour in predetermined amounts are weighed into a blender in 400-lb batches and mixed dry for about an hour. The mixture then is dropped through a pipe into either of two mixing units. A weighed amount of hydrolyzed ethyl silicate, which previously has been aged for 30 hours in storage tanks on the second floor, is added to the dry refractories in the mixing unit.

The semi-solid investment is placed in the flasks with a hand scoop. Filled flasks are set on a vibrating conveyor about 24 ft long on which they move at the rate of about 5 in. per minute. During that travel the investment is packed thoroughly around the cluster, and the gelling of the ethyl silicate is completed to form a solid.

At the end of the conveyor the mold is removed from the plate by a sharp blow. The excess investment material contained in the paper extension is removed from the mold by an abrasive saw, and the molds are placed on racks for movement to the dewaxing and preheating furnace or stored on shelves for not more than 24 hours. The furnace performing the two functions of dewaxing and preheating is a gas-fired pusher type unit 40 ft long. It is divided into five zones of which only the last four are fired. Temperatures range from 375° F at the entrance or non-fired zone to 1600 to 1900° F at the exit end where the molds are removed for pouring.

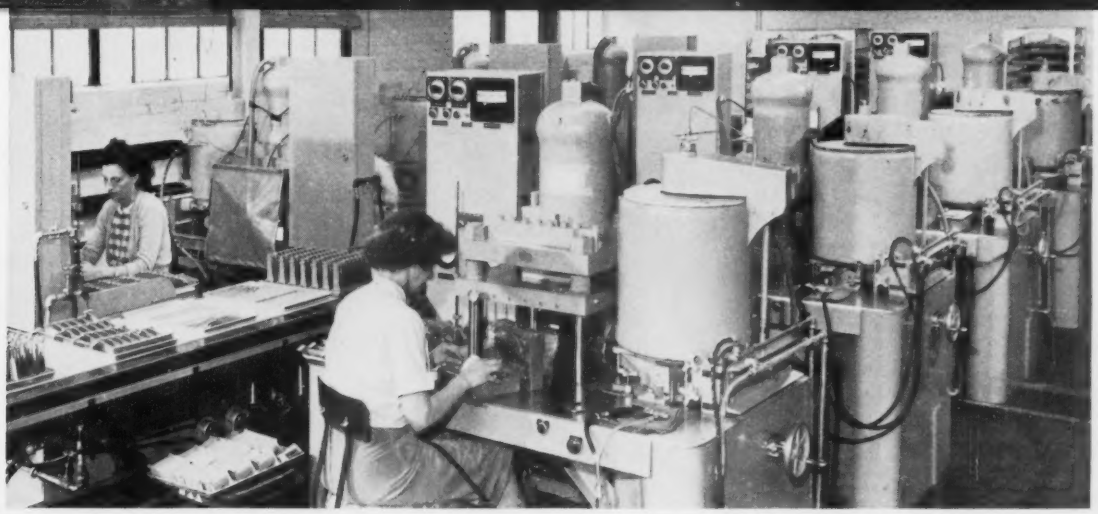
Molds to be treated are placed on high-alloy steel trays 2 ft long and 3 ft wide, sprue opening down. Twelve molds in two tiers of six each constitute a load. The tray and its load are



In the process using separate ceramic sections to form a mold, the slurry is poured on the metal pattern surrounded by a flask

pushed into the furnace by a pneumatic ram, and one tray is pushed in every hour. Total time in the furnace is approximately 24 hours. Molds are removed from the furnace with tongs, clamped pneumatically over the opening of the melting furnaces and filled with molten metal by inverting the furnaces.

Melting Department—Metal melting is accomplished in two rows of four furnaces arranged in front of and on each side of the dewaxing and preheating furnace. The electric arc melting furnaces are the indirect type, mounted on trunnions so that they may be inverted. Each furnace is charged with just enough prealloyed master



Machines specially designed by the firm's engineers are employed for injection of wax or plastic into steel dies to form the patterns to be invested

Carefully mixed investment material is placed in flasks having paper extenders. Filled flasks then are set on the vibratory conveyor at the right

melting stock in shot form to fill one mold. Melting time and temperature of the metal are rigidly controlled and recorded. Rate of rollover in inverting the furnace also follows prescribed regulations based on the alloy, intricacy of the mold cavity and section thickness of the casting.

Metal temperature is determined by portable radiation type pyrometers suspended from the roof trusses on counterbalances so that they can be drawn down for use, and then pushed up out of the way. Pyrometers are connected to recording and indicating instruments mounted on a panel board adjacent to the furnaces. To facilitate determinations of the proper pouring temperatures the instruments are interconnected to a bank of three colored lamps on the board. One is red to indicate that the metal is too hot, another is green to signal that the metal is too cold, while the third lamp located between the other two is white to indicate that the metal is at the proper pouring temperature.

After being filled with molten metal, the molds are unclamped from the furnaces, placed on steel skids and moved outside the building to cool for about 24 hours. Cooled molds are transported to the cleaning department where the clusters of castings are removed from the mold on a vibratory shakeout. Clusters are placed on a table type

Since only castings of the highest quality are acceptable, they undergo careful and rigid visual inspections at various stages in their production

abrasive blast unit using steel grit as the cleaning medium. Clusters make several passes through the machine and are turned over each time to permit the abrasive to reach all areas.

Following that operation slightly different treatments are accorded the clusters depending upon whether they are cored or solid. Cored vanes are left in cluster form, placed in wire baskets and immersed in a caustic soda bath maintained at 900° F for 20 minutes, followed by a hot-water rinse. Castings then are separated from the gating system by circular abrasive saws. In the case of solid castings, the gating system is cut off first and then the castings are subjected to the salt bath treatment.

The salt bath unit is unusual in that it is totally enclosed and the operators on the outside manipulate hoists which transfer the baskets of castings into and out of the caustic and rinse baths. After rinsing, the castings are placed in a tumbling type blast machine to remove the smudge resulting from the salt bath treatment.

Finishing Operations—Cleaned castings are set in trays and transported to the finishing department in building B where the first step is a rough or first visual inspection. Then they are distributed to a number of operators who subject them to various finishing operations performed with abrasive belts and points. Next the castings are sandblasted to provide a uniform surface appearance to aid in the final visual inspection which follows. The castings are moved in trays to the gaging department where they are checked on various fixtures to see that they meet required tolerances. After the gaging operation the castings are subject to Zyglo inspection and then sent to the x-ray department for radiographic examination. Castings finally are transported to the shipping department where they are packed and boxed for shipment.

Wax patterns in cluster form are dipped in a thin, refractory slurry, as shown at right, and coated with dry, coarse silica sand or grog as depicted at the left

Finishing operations play an important role in bringing the castings to the desired state of acceptance. They include careful grinding and polishing

Research and Development—An important facility of the new Muskegon plant is the research and development department, which occupies 22,000 sq ft in building C. It is equipped with production equipment—including wax injection machines, a dewaxing and preheating furnace and melting furnace—for conducting development and pilot operations. Equipment also includes a vacuum melting unit which is arranged to permit continuous operation. Through a system of vacuum interlocks, the metal and hot molds can be introduced into the unit so that a constant vacuum is maintained in the melting chamber. Some advantages cited are rapid cycling and the prevention of oxidation as well as thermal shock damage to the melting crucible.

One of the company's new developments is a process to form a ceramic shell mold instead of the conventional, massive mold described previously. Known as the Mono-Shell process, the procedure consists of dipping the wax or plastic cluster into a refractory slurry and allowing it to dry or set for a short interval. Then it is redipped and the cycle continued until a ceramic shell about ¼ in. thick is built up. Completed shells then are handled in the same manner as with conventional molds.

Advantages claimed for the process include improved quality of the castings because the better refractory properties of the material used permit higher metal pouring temperatures. Slag and dirt are said to be reduced, resulting in fewer scrap castings. Since the shells use less material the molds are easier to handle and the time for dewaxing and preheating is shortened considerably. At present the method is in pilot operation, and expectations are that it will supersede the conventional investment molding process in a great many cases.

Rigid specifications on dimensional tolerances require gaging of castings in special fixtures

An Intermediate Process—Another development is an intermediate process between conventional sand foundry and investment practices. Termed Accra-Core, the method employs permanent metal patterns and coreboxes from which cope, drag and cores are made from a ceramic investment material. A quick-setting, high-temperature cement is used to bond the ceramic material, which is cast against the metal pattern or in the corebox. Molds and cores are removed, oven dried and assembled to form a complete mold. The mold is preheated to 1500-1700° F, removed from the furnace and filled with molten metal by hand shanking. Castings up to 150 lb in weight have been made from stainless and low-alloy steels.

Advantages are reported to be better surface finish and soundness accruing through use of the hot investment type mold. Surface quality is said to be in the range of 150 to 200 rms. Dimensional tolerances are closer than with conventional sand practice but not so accurate as with the regular investment process.

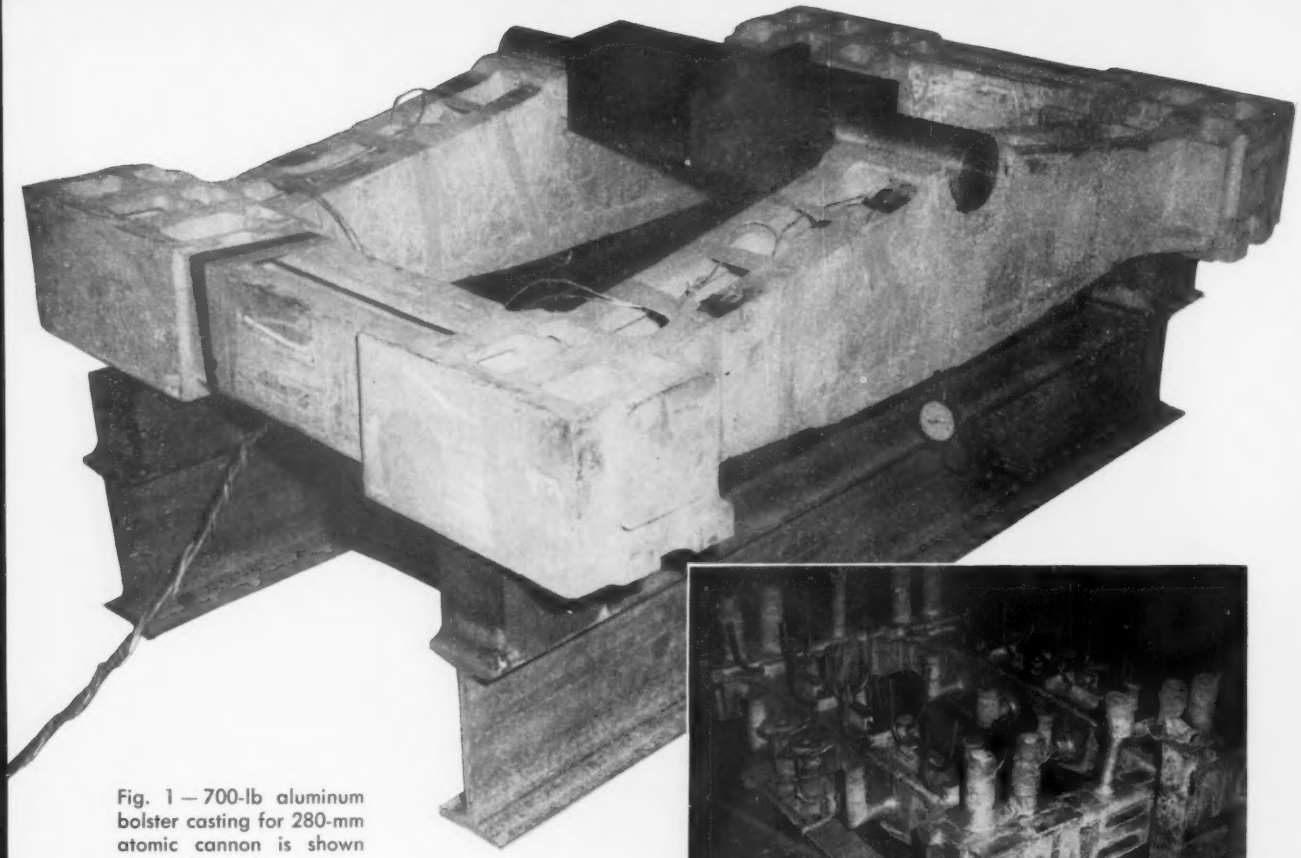


Fig. 1 — 700-lb aluminum bolster casting for 280-mm atomic cannon is shown in position for testing

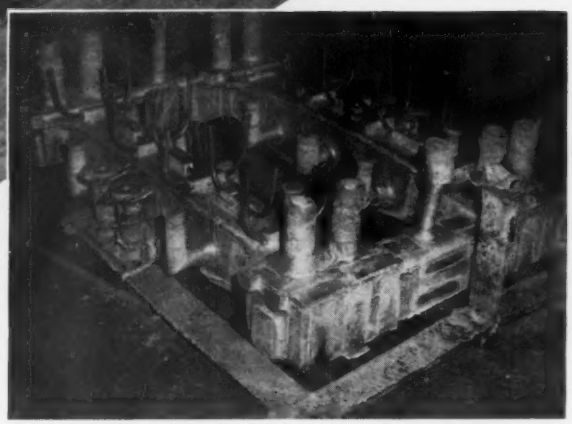


Fig. 2—Risers were placed on casting as shown here. Metal was gated into the bottom of the bolster through four insulated side risers

Lightening the Atomic Cannon

For many years, the Ordnance Corps has sponsored research which is designed to develop high-strength aluminum castings. Here's the story of a casting to replace a steel weldment and cut weight 48%

By G. D. CHANDLEY and J. L. BELSER
Metallurgists
Watertown Arsenal
Watertown, N. Y.

WHILE always desirable, the development of lightweight, high-strength ordnance material has, in this age of modern warfare, become a logistic necessity. Therefore, the use of high-strength aluminum castings which can offer a substantial weight saving over steel components is of great interest to the Ordnance Corps.

Working toward this end, the Ordnance Corps for many years has sponsored research in the aluminum casting field. This research has resulted in much valuable information concerning properties of alloys, gating systems, fluid flow, and techniques for making high-quality aluminum castings. Indeed, castings have been made with tensile properties directly comparable to those of the corresponding wrought alloy.[1] The work described here is a translation of this research information

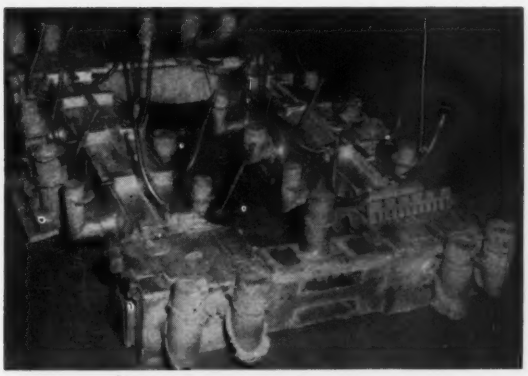


Fig. 3—Final design of casting, showing chill and riser locations. To chill the casting, 145 in. of copper tubing was located in pad prints

to a large production casting at Watertown Arsenal.

The casting selected for the experiment was a 700-lb aluminum bolster for the 280-mm atomic cannon. If it were found possible to use an aluminum casting to replace the 1350-lb steel weldment currently used, a weight saving of 48 per cent would be effected. The casting is shown in Fig. 1. It has outside dimensions of approximately 3½ x 5 ft and an average wall thickness of 2½ in.

It was well known small castings of high quality could be made using the techniques developed but it remained to make a large casting. Additional significance was given this work because aluminum bolsters initially purchased had failed because of insufficient strength.

The reasons why properties of cast aluminum do not compare more favorably with those of wrought aluminum have not been fully isolated quantitatively, but recent research indicates what must be considered in correcting the deficiency. The problem is complex, because of the large number of variables involved, such as alloy composition; size, shape, and nature of porosity in the casting; the amount and distribution of intermetallic compounds; grain size; inclusions; solidification rates; hydrogen content, and temperature gradients during solidification.

It should be noted that these variables are not independent; for example, grain size will affect the distribution and size of secondary phases, and temperature gradients during solidification affect grain size, porosity, and morphology of intermetallic compounds. There are much data in the literature concerning these factors, usually obtained by holding all but one variable constant and altering this variable in a systematic manner.

Cibula, using a heat treated cast tensile bar (constant solidification conditions) showed that alloy BS1490LM11 (approximately alloy 195) had increasingly better tensile properties as the grain size was decreased.[3] Walther et al, on the other hand, showed that rapid solidification under steep temperature gradients completely masked any effect of grain size on tensile properties.[1] Both factors disperse porosity and intermetallic phases; therefore Walther's result is not unexpected. Thus, it is easily seen that quantitative evaluation of each of these factors under all conditions is complicated.

From a practical standpoint one is able to control effects of these troublesome variables in making high-strength aluminum castings. These will be mentioned briefly because they are well known. More than average control of composition is necessary. Porosity due to gas evolution during solidification should be kept to a minimum because of its adverse effect on elongation.[2] Rounded, widely dispersed intermetallic compounds are desirable if they occur in an alloy. This condition is desirable for solution treating and aging, as well as for alloys in which massive compounds remain after solution treatment. Grain size should be kept as fine as possible by adding grain refiners and pouring at low temperatures. Foreign inclusions should be prevented by proper gating.

High solidification rates produce the highest tensile properties, other things being equal. Hydrogen content should be kept low although it may not harm tensile properties under all conditions of solidification.[2] Temperature gradients during solidification should be high to insure directional solidification. Pouring temperature should be kept low to reduce grain size and increase solidification rates. Also, certain alloys can be grain refined with titanium and/or boron additions, and this is desirable wherever possible.

Alloy Selection—The composition selected for the bolster casting was alloy 195 (Fed. Spec. QQ-601b, Comp. 4). The original bolsters which had proved unsatisfactory had been made of this alloy; it was felt that the casting techniques used could easily be transferred to other more castable alloys such as 356, if desired. In addition, 195 alloy has excellent properties when proper procedures are used, and much research information has been developed for this alloy. The alloy, (final composition 4.73 per cent Cu, 0.19 per cent Si, 0.33 per cent Fe, 0.16 per cent Ti, and balance aluminum) was made by adding 50-50 Al-Cu master alloy

and 5 per cent Ti-Al alloy to commercially pure aluminum (99%).

Melting and Pouring—Twelve hundred pounds of aluminum were required for the bolster casting. The charge was melted in an induction furnace and poured at 1350° F into a refractory-lined ladle which had been preheated to about 2000° F, and cooled to approximately 1000° F before using. Metal was degassed by plunging hexachlorethane pills to the bottom of the ladle. Nine 2-oz degassing tablets were used and their effect was checked by making a reduced pressure test before pouring. Metal was poured into the mold at 1275° F.

Molding—The mold was rammed with new synthetic facing sand backed with reconditioned black sand. Thirty-two large cores required for the bolster mold were made using a linseed-base core oil. Cores were hollowed out to reduce gas and collapsibility problems. Air-entrained (permeable) gypsum riser sleeves were used on all risers. Risers were placed on the casting as shown in Fig. 2. Metal was gated into the bottom of the casting through four insulated side risers.

Chilling the casting to produce maximum tensile properties presented the major problem. Metal chills could not be used exclusively because of the size and section thicknesses of the casting. A technique developed by research at MIT[1] was used wherein a pad was added to the pattern, through which a copper tube was molded; the tube was connected to water under normal line pressure to provide a constant low-temperature heat sink. A total of 145 in. of copper tubing was located in pad prints on the casting (Fig. 3).

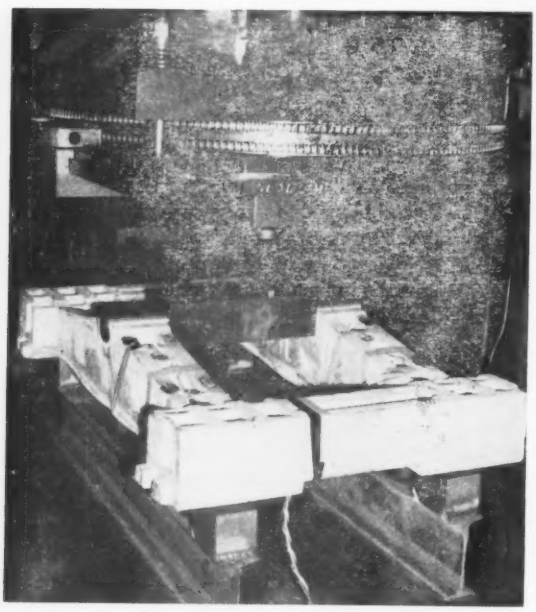


Fig. 4—Casting was tested destructively under 2,400,000-lb testing machine as illustrated here

Some practical difficulties were encountered in using copper tubes in this fashion; in the first test the metal between some of the copper tubes contained large hot tears. This problem was attacked by experimentally casting typical heavy sections of the bolster in which the copper tubes had been used. Six such sections were cast using different arrangements of copper tubes before a satisfactory, tear free section was made. This arrangement of tubes is shown in Fig. 3. Water entered one end of each tube assembly and left the opposite end in series flow, under gage pressure of 112 psi; no boiling occurred in the copper tubes.

Solid copper chills were also used at several locations. A total of 142 chills ranging in size from 1 x 1 x 8 in. to 2 x 2 x 8 in. were located to provide rapid, directional solidification. It should be noted that cope chilling and side risers were used in critical areas. In heavy-sectioned aluminum castings, large grains tend to form on the cope side of the casting, reducing tensile properties drastically. Strong cope chilling reduces or eliminates this effect.

Fig. 5—View of fracture on heavy arm of bolster casting. It occurred at 532,000 lb total load

Heat Treatment—The bolster was heat treated in a gas-fired, recirculating furnace. It was solution treated for 16 hours at 960° F, quenched in water at 150° F, and aged four hours at 310° F.

Test Results—Design requirements for the bolster specified the aluminum casting must have a minimum yield strength of 17,000 psi. The original bolsters, as tested at Watertown Arsenal, had tensile strengths as low as 12,000 psi. As a result the original bolsters were scrapped and a steel weldment was substituted. The bolster section cast at Watertown Arsenal with final chill design of Fig. 3 was heat treated and tested for mechanical properties. Three test bars cut from a section 2½ in. thick gave the following average properties: 28,000 psi yield strength, 41,000 psi tensile strength, and 6 per cent elongation. The results from heavy critical sections at various locations on the casting were as shown in this table.

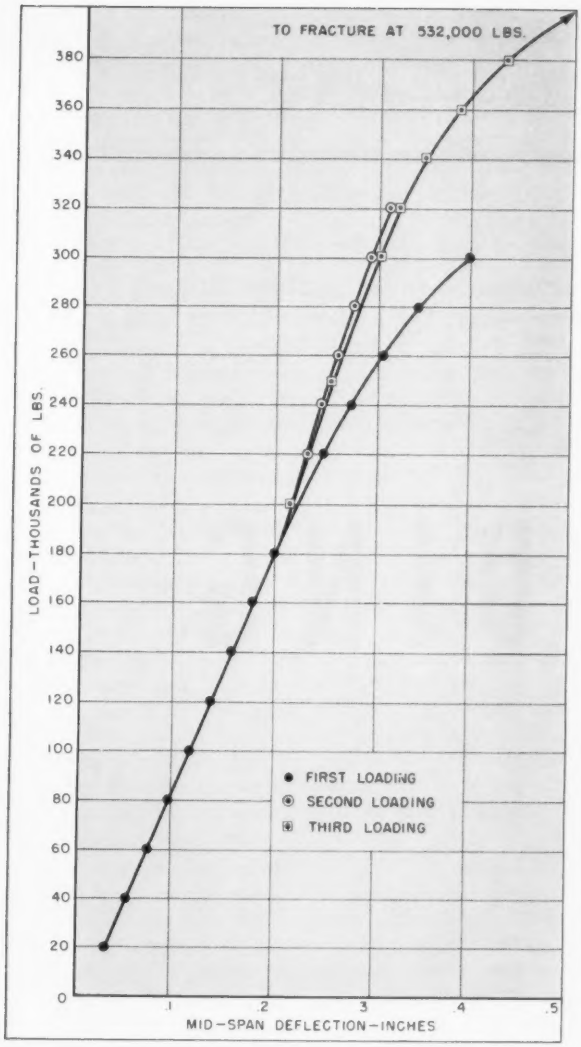


Fig. 6—Graph illustrates total load plotted against midspan deflection of bolster casting

Sample No.	Yield Strength	Tensile Strength	Per Cent Elongation
*1	28,500	41,000	4.5
*2	27,500	47,800	10.5
*3	28,500	36,800	3.0
4	29,000	40,700	4.5
5	25,500	40,500	7.0

*From 2½-in. section. Samples 4 and 5 are from 2-in. and 1¾-in. sections, respectively.

The bolster casting was tested destructively, using a 2,400,000-lb hydraulic tensile machine. The original arrangement for testing the casting is shown in Fig. 4. Off-center loading was applied to the casting to simulate service conditions. As can be seen in this view, the side arm of the casting is designed heavier than the opposite section to bear the greater load. Fig. 1 shows a closeup of the strain gages and the gage which was used to measure midspan deflection of the casting.

Test results from loading the casting as described are given in Fig. 6, which shows something of more direct interest than strain gage measurements. It is a plot of applied load in pounds vs. midspan deflection of the bolster. The original casting design called for a total load of 194,000 lb, allowing an appropriate safety factor. As may be seen from the graph, the first loading reached 300,000 lb—well above the service load. Results of the second loading show elastic behavior up to a load to 320,000 lb. This is due to work hardening of the bolster, and indicates that aluminum castings can be strain hardened before machining. It can be accomplished, however, only when adequate steps are taken to produce castings of high ductility.

The third loading is plotted to 400,000 lb, and finally the heavy arm of the bolster broke with a sharp report at 532,000 lb total load. The arm with the thinner section did not fracture or exhibit cracks after testing. The fracture in the heavy section is shown in Fig. 5.

Significance of Results—The basic significance of these results is that the application of research information has yielded castings of greatly improved quality. Those foundries in the light metals industry which maintain adequate technical staffs can open new markets for their products. It has been shown this research information is applicable to heavy aluminum castings, and that it can be applied practically.

Of practical significance for this one casting are the following observations:

1. For aluminum castings of large cross section, chilling by means of light, water-cooled tubes is both practical and desirable.

2. Thickness of the heavy arm of the bolster could be reduced by at least one-third and still meet performance specifications; the lighter arm could be reduced substantially, because it did not fracture even at more than two and one half times the design stress.

3. It is possible, in this case, to work harden the casting before machining to raise the yield strength significantly and eliminate plastic distortion well above the service load.

Acknowledgments—The authors wish to express their thanks to the Rodman Laboratory of Watertown Arsenal for sponsoring this work. Also, they wish to express their appreciation to Prof. H. F. Taylor of MIT, Prof. J. F. Wallace of Case Institute of Technology, and H. Rosenthal, formerly of Frankford Arsenal, for their encouragement and guidance.

The successful completion of this casting could not have been made without constant reference to the results of research sponsored by the Pitman-Dunn Laboratories of Frankford Arsenal.

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Water meter housing was made in a mold faced with CO_2 sand at Standard Buffalo Foundry Inc., Buffalo

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MOLDING with CO_2

The CO_2 process has won considerable acceptance in coremaking, and foundries now are turning to its use in molding. Here's a look at that application based on experiences of several shops

Mold for a miscellaneous casting is gassed with CO_2 at Syracuse Foundry Inc., Syracuse, N. Y.

THE CARBON dioxide process has found wide application as an economical method for the manufacture of cores. Although relatively less work has been done in applying the process as a molding medium, the authors believe that molding operations offer a much broader field of application than does coremaking. This article will deal only with the use of the CO_2 process in the production of molds.

The three methods for using CO_2 as a molding medium are:

1. Complete CO_2 sand mold.
2. Use of CO_2 sand as a localized facing.
3. Use of CO_2 sand for a full facing.

While all three methods are being used successfully, the complete CO_2 sand mold and localized facing methods are somewhat impractical for several reasons. The explanation, therefore, of the first two methods will be brief.

Complete CO_2 Sand Mold—This process is used when the entire mold is made from the treated sand. Material cost with this method is high and is recommended only where flask equipment can be eliminated or where the castings can be poured in an unconventional manner. Gassing each half of the mold can be done in any of the three methods described later in the article. After gassing, the molds are washed, clamped or pasted, and poured. Unless the foundry has some type of sand scrubbing device this method is not recommended because the CO_2 sand returns are high and the problem of high consumption of new sand makes the cost prohibitive.

Localized Facing Method—In this method the CO_2 sand mix is used as a facing in one or more specific areas of the pattern. The remainder of the pattern surface is then faced with conventional sand. This practice is normally used where a superior finish is required in a specific section of the casting or where metal erosion is a problem, such as in front of an ingate. The green sand directly over and adjacent to the CO_2 facing is rammed very hard to insure high rammed density. One serious problem usually appears during ramming. The CO_2 sand has a tendency to shift and spread against the pattern surface; consequently an addition of 1 to 1½ per cent by weight of fireclay is recommended to help minimize this shifting.

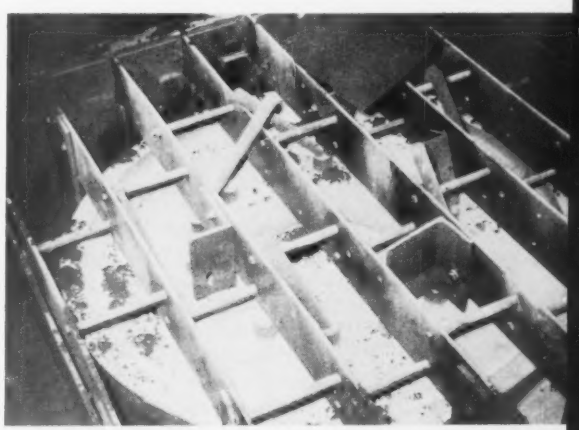
Gassing of the localized facing usually is done with a muffleboard after the mold is inverted and the pattern is drawn. If the facing area is not too large, gassing also can be done with a plunger attachment. The CO_2-treated facing can be washed with a volatile solvent type mold wash. During shakeout the facing usually comes out as a core butt, so there is no problem of the returned CO_2 sand in this system.

Full Facing Method—The full facing method is gaining wide acceptance. It can replace either green or dry sand facing successfully. The application is simple. The sand and binder mixture is riddled or shoveled over the entire pattern surface and backed up with green heap sand. The facing thickness will normally range from 1 to 3 in. This thickness is a direct function of the pattern depth. For pattern depths up to 6 in. a 1-in. facing is sufficient; for depths from 7 to 12 in. a 2-in. facing is usually sufficient, and for deeper patterns 3 in. should suffice.

The green sand backup does not have to be particularly low in moisture if the mold is poured the same day it is made. If the mold is made a day or two in advance to the pouring, however, there is a possibility of moisture pickup by the CO_2 facing and therefore it is advisable to use a backup sand of moderately low moisture content— 3 to 3½ per cent. As in the localized facing method the mold should be rammed hard to insure high rammed density. While the flowability of the CO_2 facing is good, care must be taken to insure a uniform density over the pattern surface if good casting finish is to be obtained.

Facing Mixes—The following two mixes have been used successfully in gray iron and brass shops as a molding mix:

Mix 1—200 lb Port Crescent lake sand, 52 AFS;



CO_2 sand is used as facing in a pump housing mold at Pohlman Foundry Co., Buffalo

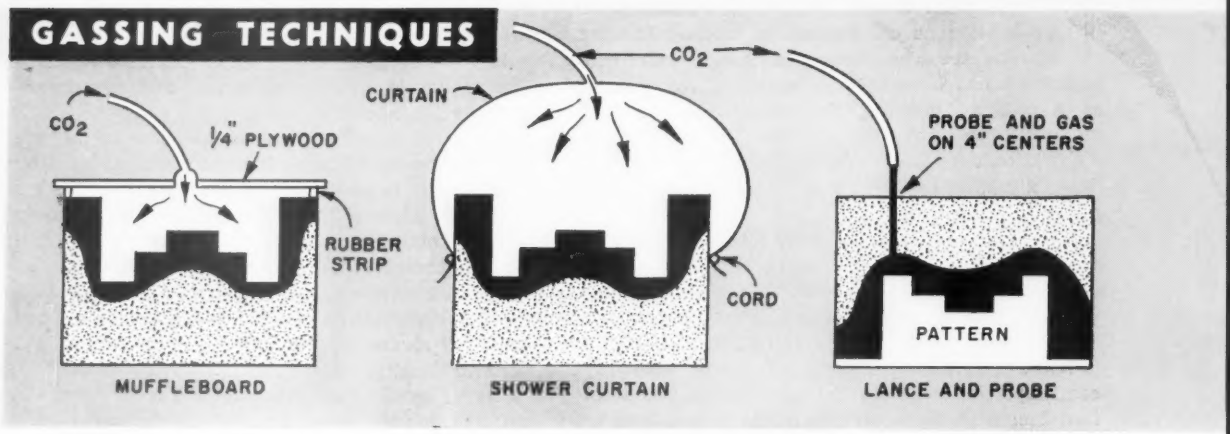
100 lb McConnellsville bank sand, 105 AFS; 1½ per cent pitch compound (85 per cent pitch, 15 per cent dextrine); 4 per cent commercial proprietary sodium silicate binder; ½ to 1½ per cent fireclay.

Mix 2—300 lb Jersey silica sand, 85 AFS; 1½ per cent pitch; 15 per cent dextrine; 4½ per cent commercial proprietary sodium silicate binder.

The following mix has been used successfully in steel foundries: 300 lb Jersey silica sand, 85 AFS; 2 per cent iron oxide; ½ to 1½ per cent fireclay; 4½ per cent commercial proprietary sodium silicate binder.

The mixing cycle suggested for a slow-speed muller is 1 minute for all dry materials, 4 minutes with the binder addition.

The major concern when picking a base sand or blend of base sands to be used for a CO_2 facing mix is the fineness and the grain distribution of the sand. While it is true that finer sands, 70 to



Drawings illustrate four different methods of gassing mold made with CO_2 sand

90 AFS fineness, require more binder to develop optimum strength and hardness, it must be remembered that the grain fineness of the sand will have a direct bearing on the casting finish. Therefore, it is practical to use the finer sands to obtain a better casting finish. Also, by using finer sands the use of a wash can be eliminated in many cases.

The experience of the writers has been that the best average fineness is in a range of 70 to 85 AFS. The same care as to grain distribution should be taken when picking a sand for the CO_2 process as is normally exercised in picking any sand or combination of sands for conventional foundry practice. Finer sands than those described above do not give a finish superior enough to warrant the additional cost.

For gray iron and brass molds a straight pitch can be used in place of the pitch compound; however, the pitch compound containing approximately 15 per cent dextrine affords more green strength and gives a more moldable sand. Seacoal or gilsonite can be substituted for pitch compound, but they in turn do not develop the high green strength obtained with a pitch compound. Gilsonite will give increased sand flowability and resist moisture pickup better than pitch; therefore, it is recommended that gilsonite be used in situations where molds have deep draws or overnight storage of molds is necessary.

The fireclay additions are used for green strength purposes. A range from ½ to 1½ per cent fireclay is sufficient to give green strength up to 3½ or 4 psi. Green strengths of this level normally are sufficient to handle any patterns so far encountered. Higher additions of clay should be avoided because they will reduce the gassed strength hardness and flowability of the sand.

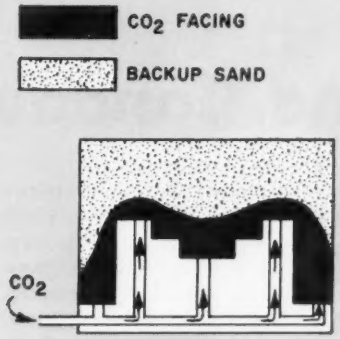
Flowability is exceedingly important in obtaining good casting finish. If the mold hardness of the facing is below 75 the casting finish which can be derived from the CO_2 facing is lost. To obtain mold hardnesses above 75 the molder must ram the backup sand hard. If the backup sand can be laid in with a slinger, the results will be even better. When using a slinger for backup, an extra inch of facing is recommended because the high speed of the backup sand when applied tends to permeate through the facing and end up against the mold surface. The additional inch of facing sand will eliminate this problem.

Gassing Techniques—There are four general gassing techniques:

1. *Muffleboard*—This technique is the most widely used. The muffleboard is usually made of ¼-in. plywood and has the same dimensions as the flask. A raised strip of rubber, usually ⅛ to ¼ in., is mounted around the lower outside edge of the board to lift the board above the flask joint. This allows a uniform gas distribution over the full facing as the gas is generated through a single hole approximately 3 in. in diameter. The plunger attachment on a CO_2 kit will fit nicely over a 3-in. opening. The muffleboard technique is used after the pattern has been drawn and after any patching is done. Gas pressure normally is 20 to 30 psi. Gassing time will range from 30 to 60 seconds for the drag to approximately 10 per cent longer for the cope. Copes are gassed slightly longer since they are handled more and, therefore, need more rigidity.

2. *Shower Curtain or Polyvinyl Fibre* — The shower curtain or polyvinyl fibre technique was introduced to minimize the making of muffleboards. The curtain is draped over the top of the mold and tied to the sides by cords. The CO_2 tank is coupled to the top center of the curtain. During the gassing the curtain blows up like a balloon over the top of the flask. The only drawback is that most flasks have sharp corners and too many perforations to use this method efficiently.

3. *Lance and Probe*—This technique occasionally is used before the pattern is drawn. It is recommended for loose patterns, cheek flasks, or where the molder might have difficulty in aligning the cope pattern with the drag. The probe is pushed through the backup, and gassing must be done in each hole. It is advisable to gas on 4-in. centers for proper gas distribution. This method is time consuming and very inefficient from the gas con-



sumption standpoint. A multiple manifold arrangement will increase gassing efficiency, but the technique does not approach the economy of the muffleboard or shower curtain. Stripping of the pattern also is somewhat difficult with this method when compared with the first two.

4. *Hollow Pattern*—This practice seldom is used because there are few foundries running CO_2 in production molding. The jobbing shop cannot afford to spend the money for the necessary pattern changes. Once again the same problems follow in the hollow pattern technique as described in the probe technique.

Mold Washes—A wide range of mold washes has been used successfully on CO_2 facing sands. As previously stated, a wash may not be necessary on some sands when proper additions are made to the sand mix and when the average fineness of the base sand is 75 AFS or higher. In general, graphitic base washes are recommended for gray iron and brass work, while zircon and silica washes are recommended for steel castings. All of these alcohol-base washes are used at very low Baumes. They are usually swabbed or brushed on the sand surface because spraying tends to cause tear drops on vertical surfaces. They are usually torched or ignited. The heat generated by the alcohol or other solvent has no harmful effect on the facing; on the contrary, the heat tends to make the surface somewhat harder.

Advantages as a Molding Medium:

1. No baking of molds.

2. Greater flask turnover per day. This is especially advantageous if the foundry has a continuous or long pour. Often two or three molds can be made per flask instead of one per day. If the foundry has a short pour and can get only one mold, at least rush orders can be handled more quickly because castings can be poured the same day the mold is made.

3. Saves crane time; the molds do not have to be transported to the ovens and back to the pouring station.

4. No gating or risering changes when used as a substitute for dry sand. The mold wall movement and thermal characteristics of the CO_2 sand are similar to those of conventional dry sand.

5. No adjustments in metal pouring temperatures are needed.

6. Surface finish equal to or often slightly better than that which is obtained with conventional dry sand facing.

7. Rodding and gaggering of molds can be reduced.

8. Dimensional accuracy of castings is better.

Problems in Using CO_2 Sand:

1. Sand used in the mix must be dry and of room temperature.

2. The sand has a limited bench life; it must be covered with dampened burlap or plastic sheets or kept in closed containers.

3. Patterns must be kept in good condition and require adequate draft. If wood patterns are used, they should be painted or shellacked. Raw wood patterns will cause stickiness even if coated with a dry parting since the moisture in the facing tends to migrate into the grain of the wood.

4. Material costs are slightly higher than those for best dry sand mixes.

5. Gating and risering may have to be modified when used as a substitute for green sand facing. Heat is dissipated more rapidly by CO_2 facing sand than by green sand, metal loses its fluidity faster, and cold shuts may result. A higher pouring temperature or increased cross-sectional area of the gates will remedy the problem.

Completed mold for pump housing casting made at Pohlman Foundry Co. is ready for gassing

Summary—While the CO_2 process offers a new tool to the foundryman, it is obvious that it is not an adequate or complete substitute for present conventional processes. Each job must be analyzed to determine if the process is applicable. The advantages are numerous and the results can be justified in many cases from the standpoints of economics and improvement in casting quality.

United States and Canada

FOUNDRIES in the United States and Canada total 6320, according to data compiled by FOUNDRY from the new edition of *Penton's Foundry List*, just published by the Penton Publishing Co., Cleveland. This study is conducted every other year.

Although the figures below indicate an increase in total number of foundries since 1955, most classifications (by type of metal cast) show decreases. This apparent discrepancy is accounted for largely by the fact that the inclusion of die casters in the totals is more nearly complete than was true two years ago, when that type of foundry was first added to the list.

Ferrous Foundries—Number of iron foundries continues to shrink. The gray iron total of 2578 is off 151 in two years and brings the drop from the postwar peak in 1947 to 860. Malleable foundries declined from 130 to 124. Steel foundries showed a gain from 452 to 480, the increase coming principally in number of investment mold shops.

Nonferrous Trend Mixed—Aluminum foundry total reached a new peak of 3404, only about 50 more than in 1955 but a gain of 447 since ten years ago. Brass and bronze foundries dropped from 2723 in 1955 to 2614, while magnesium foundries showed a loss of 27 with a 234 total. Foundries casting nonferrous metals exclusively now

Geographical Distribution of Foundries

	Total Foundries		Gray Iron Foundries		Steel Foundries		Malleable Foundries		Exclusive Nonferrous Foundries		Brass & Bronze Foundries		Aluminum Foundries		Magnesium Foundries		Zinc Foundries
	1957	1955	1957	1955	1957	1955	1957	1955	1957	1955	1957	1955	1957	1955	1957	1955	1957
Alabama	98	100	74	82	9	10	2	2	19	14	24	24	47	39	1	1	4
Arizona	11	7	6	4	3	1	..	..	3	3	7	3	8	4	..	..	3
Arkansas	28	24	10	11	1	1	..	..	17	12	9	7	19	16	..	2	5
California	562	532	121	126	46	41	4	3	405	370	217	228	375	352	35	45	120
Colorado	58	53	20	20	6	4	..	..	36	31	22	24	37	37	3	1	11
Connecticut	160	160	38	46	9	6	6	6	110	106	83	81	88	100	7	9	30
Delaware	8	8	2	2	3	3	1	1	3	3	4	4	3	2	..	..	1
Dist. of Col.	4	3	3	2	1	1	1	1	1	1	2	3	3	3	1	1	1
Florida	59	53	18	19	1	1	..	..	41	33	34	32	51	45	2	2	10
Georgia	69	66	44	45	4	4	..	..	21	17	26	28	36	32	1	1	3
Idaho	7	8	6	7	1	1	..	..	..	..	2	4	4	6	..	..	1
Illinois	485	485	150	160	32	32	15	19	306	290	157	166	263	260	14	18	98
Indiana	250	246	104	111	11	9	9	8	133	122	78	84	118	116	10	9	17
Iowa	79	85	48	55	2	2	1	1	29	28	21	26	36	41	2	2	10
Kansas	51	54	27	26	1	2	..	..	24	28	14	16	28	29	4	5	6
Kentucky	29	27	19	19	1	1	..	..	10	7	13	12	12	9	..	1	3
Louisiana	33	31	17	17	7	6	..	..	11	10	14	15	17	15	..	1	4
Maine	22	24	14	19	..	..	..	..	7	6	14	17	14	17	1	..	3
Maryland	41	48	19	21	2	2	1	2	20	25	18	26	19	31	3	3	7
Massachusetts	237	233	86	91	14	13	4	3	140	132	132	135	141	135	6	11	29
Michigan	455	436	148	156	30	29	8	8	277	258	146	149	203	193	28	36	100
Minnesota	98	95	47	50	8	7	1	1	42	38	36	38	48	47	5	3	14
Mississippi	14	13	10	10	..	..	..	..	4	3	6	7	9	5	..	..	..
Missouri	130	138	41	46	12	11	1	1	81	84	51	58	75	80	2	3	19
Montana	5	5	4	5	..	..	..	..	..	..	3	4	1	2	..	..	1
Nebraska	25	26	13	13	2	1	..	..	12	12	16	14	19	19	1	1	5
Nevada	1	2	1	2	1	1	..	..	..	..	1	2	1	2	..	..	..
New Hampshire	23	23	10	12	1	2	1	1	11	..	13	16	16	18	1	2	3
New Jersey	234	233	69	73	17	16	1	2	152	147	107	113	123	127	9	11	50
New Mexico	7	4	1	1	..	..	..	..	5	3	5	4	6	3	1	..	1
New York	433	413	142	146	32	29	7	10	264	238	218	215	254	241	29	19	76
North Carolina	64	65	51	54	..	..	..	..	14	12	37	38	47	43	..	2	1
North Dakota	4	3	3	3	..	..	..	..	..	..	1	1	3	3	..	..	..
Ohio	577	585	210	223	36	38	16	17	327	315	216	233	295	299	21	26	69
Oklahoma	53	46	25	23	2	1	..	..	27	21	22	18	30	22	2	..	4
Oregon	58	65	23	33	7	9	..	..	29	25	25	31	31	31	2	3	12
Pennsylvania	543	526	253	266	66	64	15	13	235	210	236	235	239	244	11	7	51
Rhode Island	40	43	10	14	..	..	1	1	28	28	16	20	20	20	2	..	10
South Carolina	22	22	17	17	1	1	..	..	6	5	19	17	19	16	1	2	..
South Dakota	4	3	3	3	..	..	..	..	..	..	1	1	2	2	..	..	..
Tennessee	78	75	55	58	3	3	..	..	23	17	31	33	32	36	1	3	5
Texas	168	153	69	69	16	13	1	1	86	76	82	78	103	90	4	4	28
Utah	17	18	14	15	1	1	..	..	3	3	6	6	6	5	..	..	..
Vermont	16	16	14	14	..	..	..	..	2	2	4	5	5	6	..	..	1
Virginia	51	54	42	48	4	5	..	1	9	6	31	31	31	28	1	1	4
Washington	73	75	34	37	18	17	1	1	31	31	40	43	45	47	3	2	14
West Virginia	31	33	16	16	2	2	1	1	12	14	17	18	11	13	..	2	1
Wisconsin	243	233	108	111	24	21	11	11	111	100	86	95	118	112	4	6	29
Wyoming	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total U. S.	5,758	5,650	2,259	2,402	437	411	109	115	3,127	2,895	2,363	2,458	3,111	3,046	218	245	864
Canada	562	558	319	327	43	41	15	15	212	204	251	265	293	309	16	16	59
U. S. & Canada	6,320	6,208	2,578	2,729	480	452	124	130	3,339	3,099	2,614	2,723	3,404	3,355	234	261	923

Have 6320 Foundries

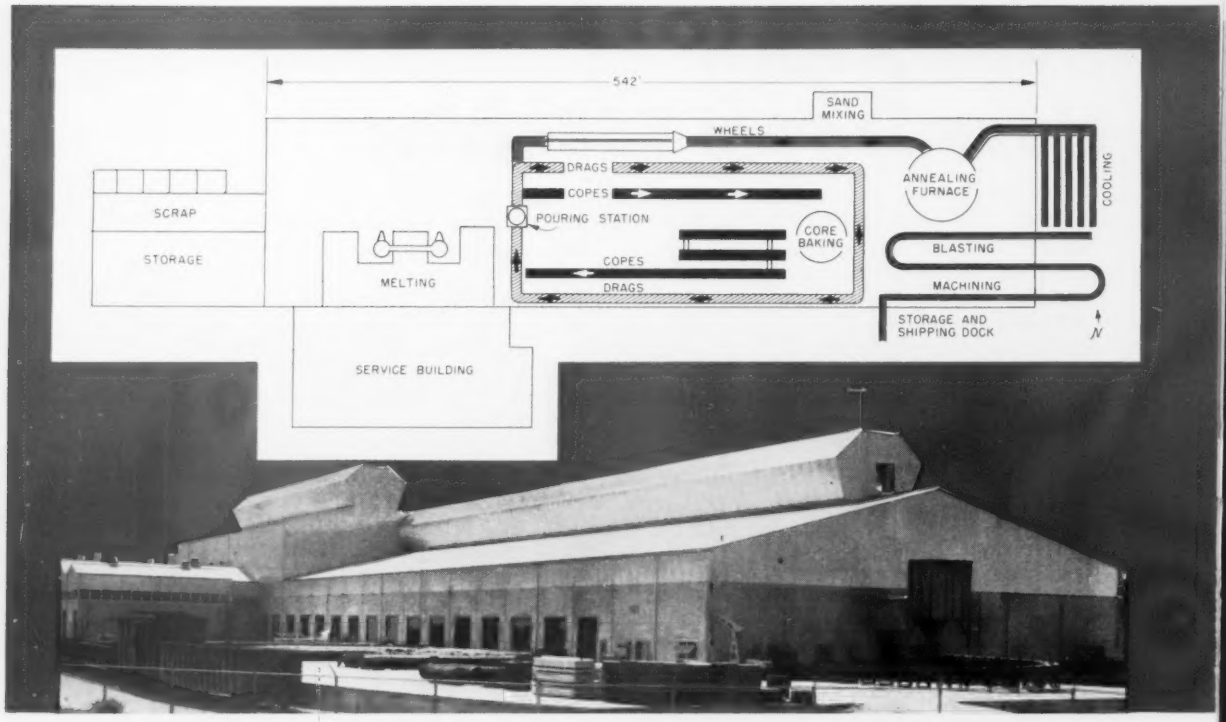
number 3339, although ferrous foundries having nonferrous departments bring the total for all producers of nonferrous castings to 4376, against 4212 two years ago.

Casting Processes—Users of the shell molding process have increased 50 per cent in number the last two years and more than 200 per cent since 1953. Current total of shell mold foundries is 638. Approximately one foundry out of 12 uses shell cores. More than 25 per cent of all foundries said they use the CO_2 process. Application of the permanent mold process continues to grow, 821 foundries employing it comparing with 761 in 1955. The number of plaster mold process users increased from 192 to 230, and centrifugal casting applications rose from 235 to 252.

Pattern shops operated by foundries continue to decline in number, the drop since 1955 being about 400. Among other data collected in this study are these: 3473 foundries have machine shops; 2539 operate welding departments; 1348 do heat treating, and 405 employ radiographic inspection.

Distribution—No change occurred the last two years in ranking of the principal foundry states. Ohio leads with 577 foundries, followed by California, Pennsylvania, Illinois, Michigan, Indiana, and Wisconsin.

Permanent Mold Foundries		Centrifugal Casting Foundries	Plaster Mold Foundries	Investment Mold Foundries		Shell Mold Foundries		Die Casting Plants	Pattern Shops	Strictly Jobbing Foundries	Strictly Captive Foundries	Jobbing & Captive Foundries	
1957	1955	1957	1957	1957	1955	1957	1955	1957	1957	1957	1957	1957	
6	7	10	6	..	1	12	4	7	75	40	10	48	Alabama
6	4	..	..	2	..	1	2	4	5	4	..	7	Arizona
9	8	..	1	..	..	2	2	10	13	16	4	8	Arkansas
113	102	28	20	25	18	65	32	150	222	345	72	145	California
18	16	..	4	..	..	1	2	16	25	21	12	25	Colorado
27	23	4	5	6	2	18	10	31	71	89	30	41	Connecticut
..	..	..	..	..	..	..	..	1	6	2	1	5	Delaware
2	1	..	1	1	1	1	1	1	4	..	2	2	Dist. of Col.
14	11	3	2	..	..	7	1	11	36	26	8	25	Florida
9	10	1	5	..	..	3	5	8	41	25	10	34	Georgia
1	3	1	1	..	..	2	1	1	6	2	..	5	Idaho
56	55	12	20	11	10	46	40	124	218	258	76	151	Illinois
37	31	8	9	5	3	26	21	37	129	128	43	79	Indiana
9	9	..	2	..	2	3	..	11	51	29	19	31	Iowa
9	6	..	3	..	1	1	..	6	34	22	7	22	Kansas
..	1	..	1	1	1	3	..	4	16	10	9	10	Kentucky
3	4	..	..	..	..	..	..	4	21	13	7	13	Louisiana
..	1	..	1	..	..	..	..	3	12	8	3	11	Maine
8	8	3	..	..	..	3	1	7	21	16	14	11	Maryland
18	16	12	9	11	9	16	18	31	107	128	40	69	Massachusetts
54	46	21	14	12	10	59	44	120	187	255	59	141	Michigan
15	13	1	3	4	4	8	4	16	50	51	13	34	Minnesota
2	2	..	..	..	..	..	..	..	7	6	1	7	Mississippi
15	20	2	1	1	3	20	14	25	60	57	25	48	Missouri
2	1	..	..	..	..	..	..	1	3	1	1	3	Montana
8	6	..	3	1	..	4	1	7	21	4	6	15	Nebraska
1	1	..	..	..	..	..	1	..	1	1	..	..	Nevada
2	1	..	1	2	2	3	1	5	17	12	3	8	New Hampshire
37	29	17	11	8	8	35	23	60	100	138	40	56	New Jersey
1	2	..	1	..	..	..	..	2	3	2	2	3	New Mexico
60	46	23	17	26	27	54	40	90	229	222	76	135	New York
5	3	1	2	..	..	3	..	4	41	23	13	28	North Carolina
1	..	..	..	..	..	..	..	..	2	2	..	2	North Dakota
73	67	23	26	13	11	45	33	91	296	324	83	170	Ohio
5	1	2	2	..	..	5	3	6	33	25	6	22	Oklahoma
7	4	3	1	3	1	7	7	15	21	24	1	33	Oregon
36	40	22	18	11	6	53	35	61	322	269	84	190	Pennsylvania
2	4	4	4	..	1	3	4	10	15	24	3	13	Rhode Island
1	..	..	2	..	1	1	1	..	19	5	4	13	South Carolina
..	1	..	1	..	..	..	..	..	2	1	2	1	South Dakota
6	7	1	1	1	1	6	2	8	54	30	12	36	Tennessee
25	22	6	8	3	2	13	10	34	89	84	17	67	Texas
4	2	1	..	..	..	1	2	..	8	8	2	7	Utah
..	..	..	..	..	..	1	1	1	11	4	..	12	Vermont
5	8	3	1	..	2	5	3	5	31	22	6	23	Virginia
7	6	3	4	2	1	14	5	14	33	39	6	28	Washington
4	4	1	1	1	1	2	2	1	20	14	2	15	West Virginia
32	28	13	5	3	3	38	20	37	120	127	38	78	Wisconsin
..	..	..	..	..	..	..	..	..	..	..	..	..	Wyoming
755	680	229	217	153	132	590	396	1,080	2,908	2,956	872	1,930	Total U. S.
66	81	23	13	9	11	48	26	81	300	232	63	267	Canada
821	761	252	230	162	143	638	422	1,161	3,208	3,188	935	2,197	U. S. & Canada



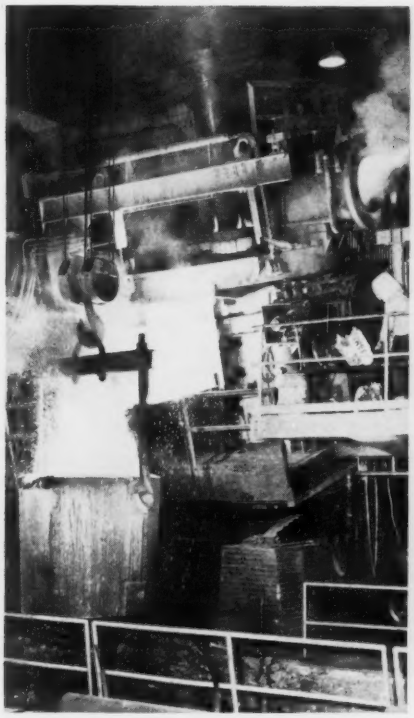
Layout and exterior view of shipping dock end of Griffin Wheel Co.'s new foundry at Colton, Calif. Operations were started recently in the production of cast steel wheels for railway freight cars

New Car Wheel Foundry

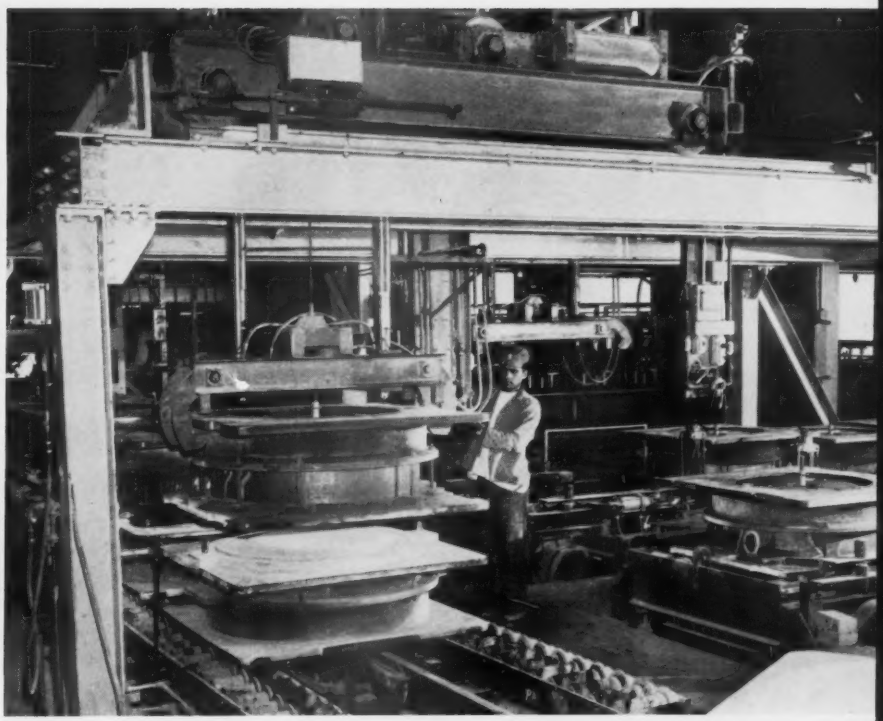
Casts in Graphite Molds

One of the most highly mechanized steel foundries is the new California plant of Griffin Wheel Co. Mechanical equipment, graphite molds, and a pressure pouring system combine to provide favorable working conditions

By WILLIAM G. GUDE
Managing Editor



Tapping one of the two electric furnaces. Each has a charge capacity of 20,000 lb



Placing cope on top of drag at closing station. Graphite molds are protected by metal flasks

PRODUCTION of cast steel wheels for railway freight cars was started recently by Griffin Wheel Co. at its new, highly mechanized foundry in Colton, Calif., about 60 miles east of Los Angeles. The wheels, to which the company has given the trade name EQS (electric quality steel), are produced by its unique process of forcing molten metal by air pressure into permanent graphite molds.

The process was developed after ten years of research, and was first used at Griffin plants in Chicago and near Montreal. A producer of car wheels for almost 80 years, this subsidiary of American Steel Foundries also manufactures chilled iron car wheels at nine other plants.

The Colton plant has an annual production capacity of 120,000 wheels, based on a daily output of 480 wheels from three 8-hour shifts. Since as-cast weight of a wheel is about 725 lb, daily requirements of hot metal will be nearly 200 tons with full production.

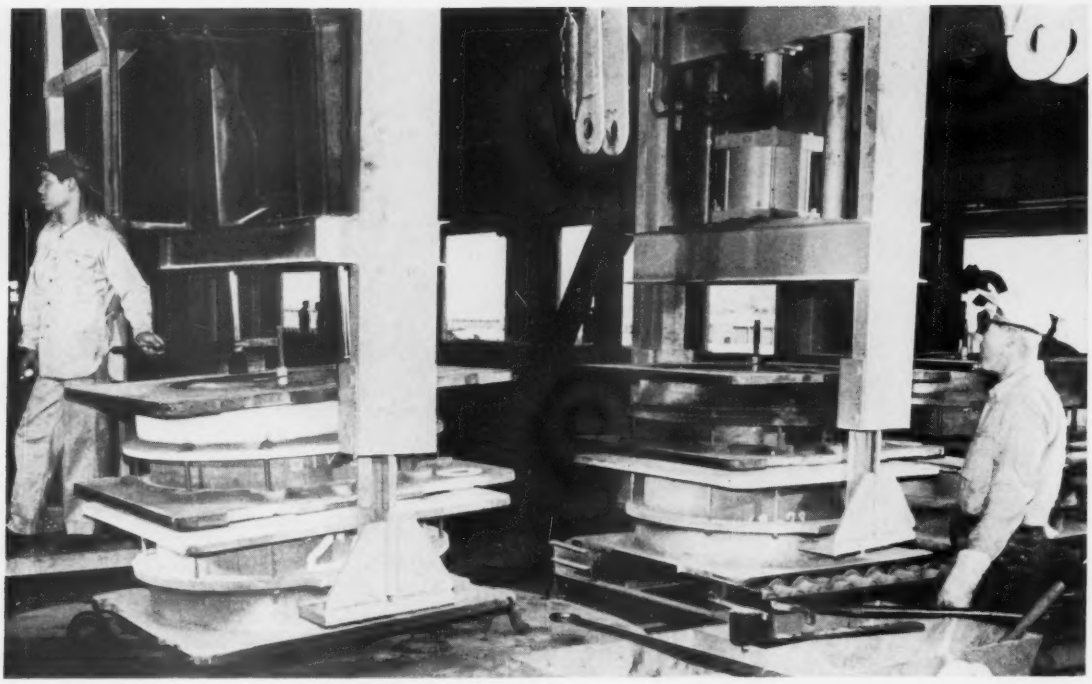
Graphite Has Advantages—Considerable experimentation went into the development of the graphite-mold process. Graphite has several desirable characteristics as a mold material, but it also presents a number of problems if it is to be used successfully for this purpose. Griffin's aim in adoption of the graphite mold was the elimination of casting defects incident to use of sand molds and the consequent savings in cleaning room costs. Good surface finish and accuracy of dimensions attainable in castings poured in graphite molds also make most machining operations unnecessary.

Desirable properties of graphite include 1) low coefficient of expansion, resulting in close dimensional tolerance of the casting, 2) good resistance to thermal shock from the high temperature of molten steel, and 3) ease of machinability of the mold cavity.

On the other hand, graphite will not withstand mechanical abuse, and it is seriously susceptible to metal erosion. The molds must be of the correct permeability; if density of the graphite is too high, blow holes and rough casting surface will result, while low density will cause metal penetration, erosion, and spalling. Much of the research done on this process, in which the Great Lakes Carbon Corp. participated, was concerned with the development of suitable graphite for the molds.

Special Pouring Technique — Because graphite erodes easily, Griffin was forced to adopt a special pouring technique. Pouring by the conventional gravity method causes mold erosion and other problems. The method finally adopted consists of forcing the metal into the mold through its bottom by air pressure at a closely controlled rate—about 60 lb per second. This speed will fill the cavity sufficiently fast to prevent cold shuts, scabs or wrinkles, and it will not cause mold erosion.

The graphite mold halves, 42 in. in diameter and 18 in. thick, are encased in metal flasks for protection. A King vertical boring mill with an elec-



At this pouring station, the ladle of steel is placed in an air-tight chamber. Air pressure forces metal up a refractory tube into the mold

tronic tracer roughs out the mold cavity, and then a one-piece tool that is contour-ground to a template is used to finish to final dimension. The molds are remachined to original contour when any surface imperfections develop. It is estimated that about 1000 wheels can be obtained from each mold before it must be scrapped.

The wheel is fed by four risers, one located above the hub and three spaced 120° apart on the rim fillet of the wheel. The risers are insulated from the graphite by shell core sleeves to obtain good feeding and to protect the riser holes. Griffin Wheel was one of the first companies in the United States to use a shell molding sand mix for this purpose. Cores also are used to cast in the trademark and serial number.

Dimensional tolerances inherent in the graphite mold process are close, being on the order of 0.1% of dimension.

Plant Layout—The Colton plant is laid out to provide an efficient flow of work and the maximum use of mechanical handling equipment. Main part of the building measures 130 x 542 feet. An 80 x 190-ft wing at one end houses a machine shop, mold repair shop, compressor room, storehouse, washroom and laboratory. A raw material storage area extending from one end of the plant measures 55 x 280 feet and includes 12 concrete bins. The foundry offices, washroom and locker facilities occupy a separate building.

Two 20-ton bridge cranes equipped with 7½ and 10 ton auxiliaries, respectively, span the storage area and handle the transfer of weighed charges to the melting department. Charge material is commercial scrap and old wheels broken to a size suitable for convenient charging.

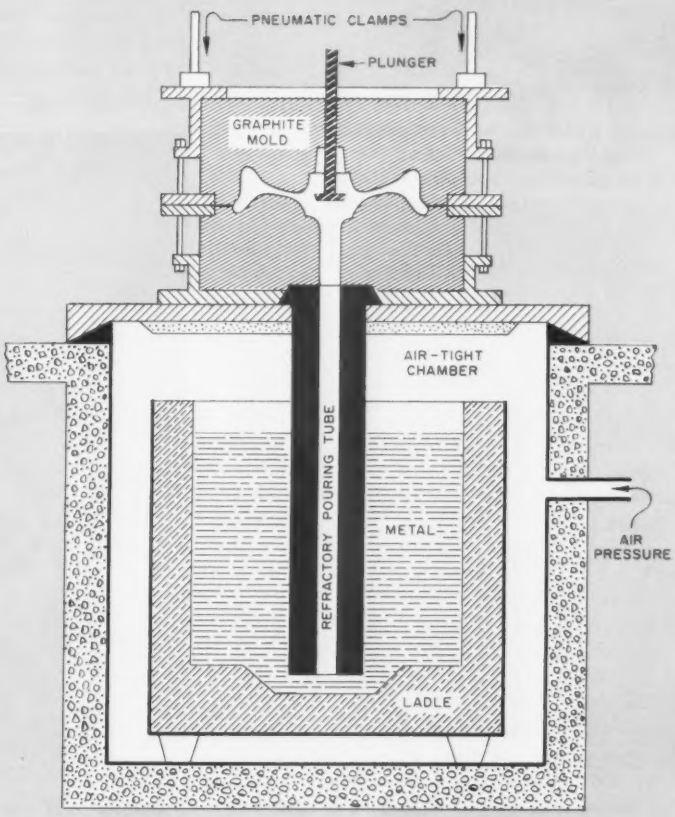
Melting units are two 10-ft electric arc furnaces having a charge capacity of 20,000 lb each. Four gas-fired ladle preheaters are situated near the furnaces. The steel is produced to this composition: C, 0.65 to 0.85; Mn, 0.60 to 0.85; Si, 0.15 min; P, 0.05 max; S, 0.05 max. Tapping temperature is 3150° F. About 19,000 lb of metal is tapped into an insulated ladle, sufficient to produce up to 21 wheels, which then is set by crane into the steel pressure pouring tank submerged in the floor.

As shown by the accompanying sketch of the pouring arrangement, a cover with a pouring spout or tube attached is clamped to the top of the tank after slag has first been removed from the metal surface. This tube, which extends to within about 3 in. of the ladle bottom, is a special refractory ceramic body developed by Griffin Wheel Co. and Electro Refractories & Abrasives Corp.

Molds arrive at the pouring tank on a walking beam conveyor and are lifted by crane to be positioned and clamped over the top of the pouring tube. Introduction of dry compressed air into the tank forces metal up the tube into the mold. This operation is performed automatically by pushbutton. Total time required to fill the mold is about 20 seconds, and metal pouring temperature is about 2950° F. When the operator sees the metal near the top of the risers he stops the pour by pushing another button. Automatically, an air-activated plunger with a graphite plug fitted to one end is pushed through the molten metal and seated in the drag. This plug prevents the metal from running out of the mold as the air pressure

This mold has just been poured. Flames come from risers at rim fillet and hub

Removing wheel from a drag. Molten metal solidifies quickly in the graphite molds



Showing arrangement of graphite mold, ladle, and tube during pressure-pouring operation. Mold risers not shown. Pouring speed is closely regulated to prevent mold erosion. Operation is pushbutton controlled

Newly poured wheel moving from production line to kiln. Heat is dissipated slowly in kiln to prevent stress formation from rapid cooling

is shut off and the tank is exhausted—all automatically. Metal in the pouring tube below the stopper then flows back to the ladle.

The poured mold is returned to a walking beam conveyor leading to a cooling kiln, and within 5 minutes the casting has solidified. High heat conductivity of the graphite mold permits the casting to set up more rapidly than the metal in the insulated risers. When the cope is lifted from the drag, the metal near the junction of the risers and wheel rim has not yet solidified; consequently, the risers come off with the cope, leaving only short stubs on the rim to be cut off later.

The cope is placed on a power conveyor for eventual return to the pouring station, and the casting is picked off the drag by its hub and placed on a slat conveyor which moves it slowly through the cooling kiln. This is a double kiln, each side of which holds 21 wheels, and the castings are cooled during their travel from about 2000° F to 1000° F.

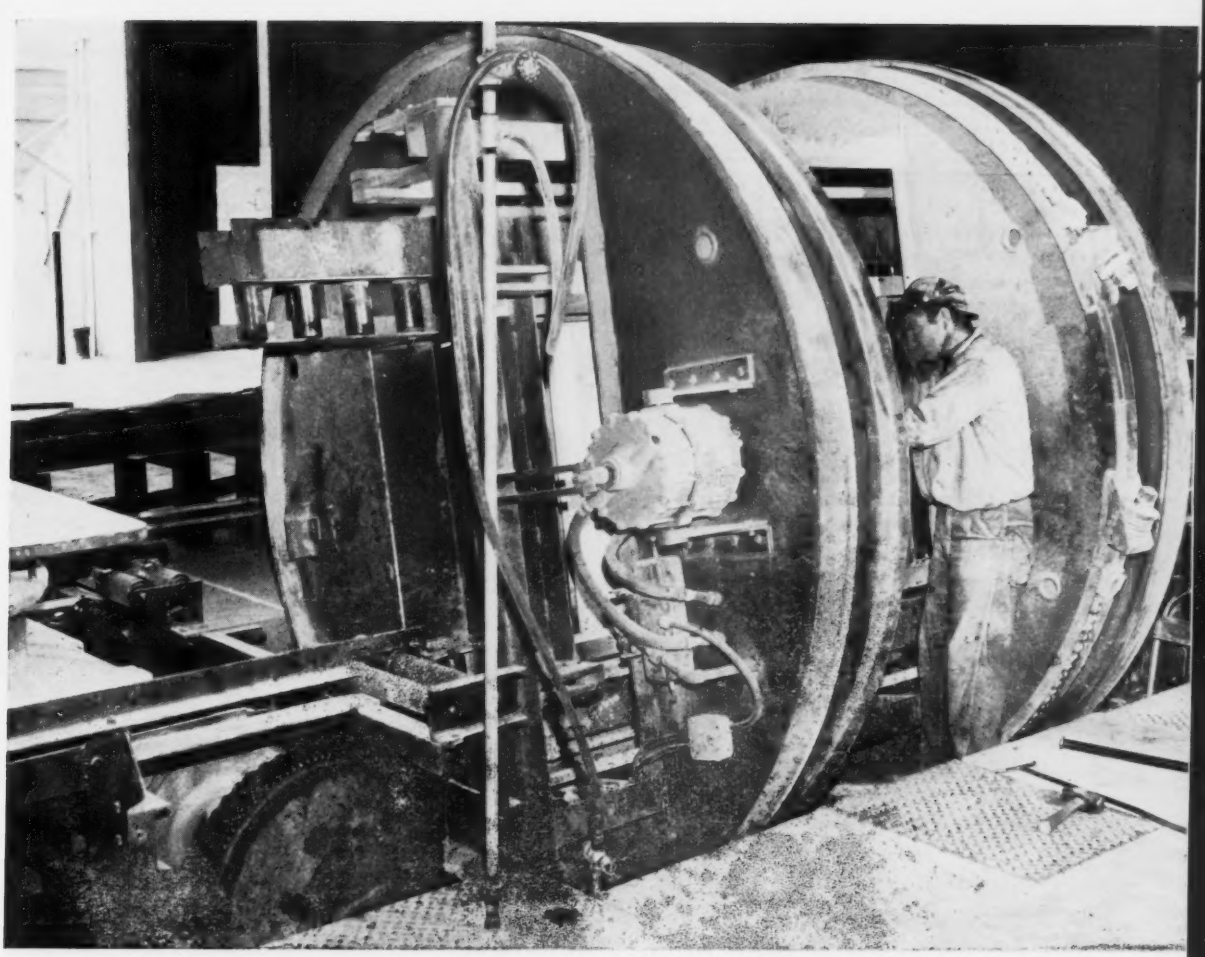
After a wheel emerges from the kiln, the riser stubs are washed off by an electric arc air torch, and the wheel is rolled over prior to chipping out the graphite stopper. Next operation is the cutting out of the solid hub in which the shaft of the stopper plunger is still encased. This shaft, being tubular, provides an opening for starting the oxyacetylene cutting. The cutting operation, largely automatic, is performed by machine in less than 2 minutes and produces a smooth and accurate bore to the wheel.

Heat Treating—At this point the wheel, its temperature down to below the critical, is moved by chain conveyor to a roller conveyor leading to a rotary, gas-fired annealing furnace. The furnace has four heat zones with temperatures ranging from 1700° F to 1600° F, and the wheels are held in it for 1½ hours. On emerging, the wheels are given a controlled airblast in their hubs to equalize the cooling rate throughout the casting and then are stacked three high before being moved outside the building for transfer to cooling conveyors. The latter consist of powered conveyors with a total capacity of 480 wheels—one day's production.

Cooled wheels are moved from the ends of the cooling conveyors to a slat conveyor for transfer to the finishing department. The wheels are mechanically destacked, upended and then carried through an airless shot blast cabinet. Succeeding steps include Magnaglo testing, preliminary visual inspection, machining of the bore, final inspection and weighing. Mechanical handling is employed between all of these operations.

Copes and Drags—Meanwhile the mold copes and drags are being prepared for re-use before being returned by conveyors to the pouring station. Normally 60 molds are on the line in service.

Rollover unit where cleaning of drag requires only a few seconds. Drag surface and pouring gate in bottom of mold are cleaned here

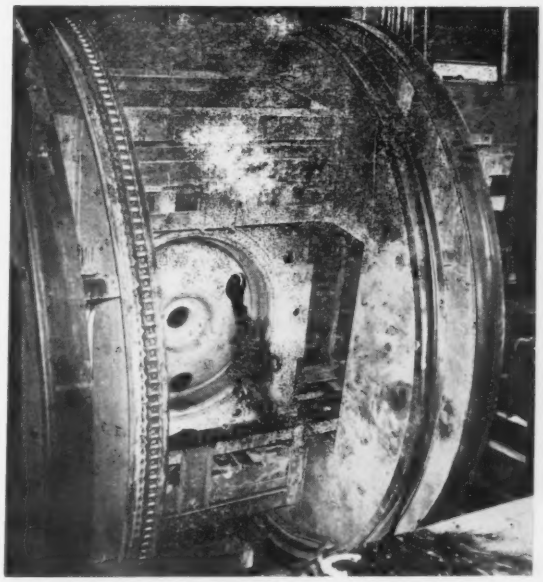


Another view of drag cleaning. Mold life is estimated to be about 1000 cast wheels

Molds put into service for the first time are heated in a kiln before entering the line. Drags already in use are cleaned and examined after the wheel has been removed. The stopper seat is checked and rebored if necessary. A special wash then is electrostatically sprayed on the mold and it is moved by conveyor to the closing station for re-use.

The cope face likewise is cleaned and sand sleeves and risers are removed from the holes. New sleeves, obtained from a rotary type core baker, are inserted in the mold. After being sprayed, the cope is rolled over and carried by conveyor to a matching drag where a cope setting crane closes the mold.

Unusually good working conditions characterize the foundry. This situation results largely from the nature of the molds and pouring practice employed. A bag type dust collector, operating at 42,000 cfm, controls dust and fumes generated by the electric furnaces, while forced air discharged at the mezzanine melting floor adds to the comfort of the furnace operators. Other collectors handle dust from the blasting unit and the hub cutter.



Copes are cleaned at this station. Cleaning and spraying are performed on cope and drag each time before a mold is poured

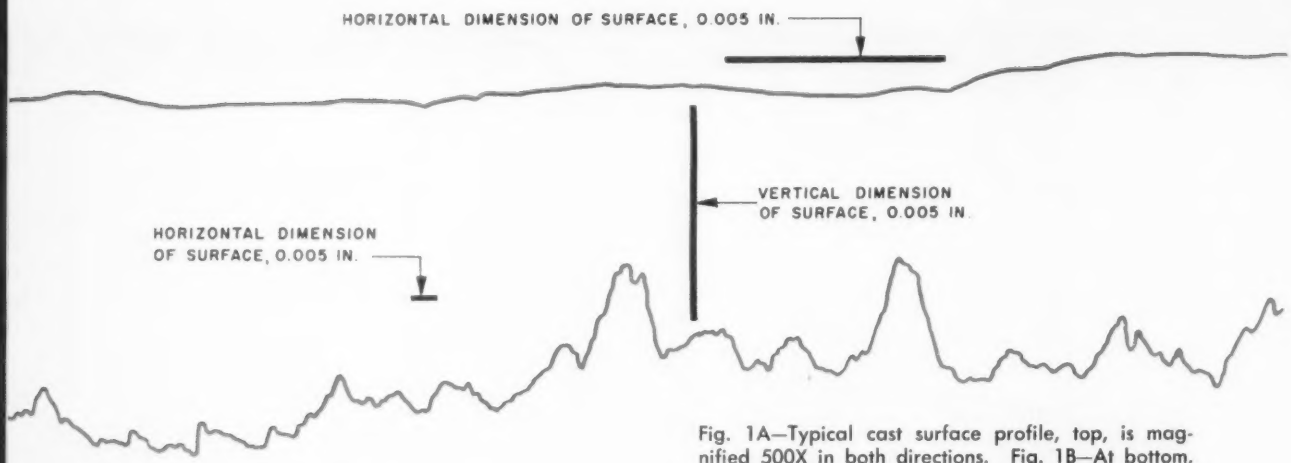

HORIZONTAL DIMENSION OF SURFACE, 0.005 IN.
VERTICAL DIMENSION OF SURFACE, 0.005 IN.
HORIZONTAL DIMENSION OF SURFACE, 0.005 IN.

Fig. 1A—Typical cast surface profile, top, is magnified 500X in both directions. Fig. 1B—At bottom, surface variations show up better when profiles are modified to accentuate vertical dimensions

The authors define the many terms describing cast surface finish, discuss the available methods of measuring surface roughness, and suggest definitions to provide a common ground for discussing finish

Measurement of

SURFACE finish has become an important consideration in the production of castings in all segments of the foundry industry.[1] Undoubtedly, the development of shell molding and the rapid growth of the investment casting industry have played a major role in focusing attention on casting roughness.

Two general reasons why the foundry industry is concerned with surface roughness are: 1. Surface appearance is an important sales consideration. 2. Economies can be derived by both the customer and the foundry by reducing surface roughness.

Some qualitative and quantitative measure of roughness must be available to evaluate and control surface roughness. Also, a common understanding of the problem must exist between parties concerned with the condition of casting surfaces. The authors' intent is to acquaint foundrymen with the need for practical methods of measuring surface roughness, to suggest definitions which will provide a common ground for discussing surface finish and to discuss possible means for measurement of surface roughness.

What Is Surface Finish?—The following definitions are presented in the ASA Standard B46.1-1955, which covers surface roughness, waviness and lay:[2]

"2-1 Surface. The surface of an object is the boundary which separates that object from another object or substance. This standard relates to surfaces produced by such means as machining, abrading, extruding, casting, molding, forging, rolling, coating, plating, blasting, or burnishing.

"2-2 Nominal Surface. The theoretically accurate design, the shape and extent of which is usually shown and dimensioned on a drawing or descriptive specification.

"2-3 Surface Irregularities. Deviations from the nominal surface, including roughness and waviness.

"2-4 Profile. The contour of a section perpendicular to a surface unless some other angle is specified.

"2-5 Roughness. Relatively finely spaced surface irregularities, the height, width, and direction of which established the predominant surface pattern. Irregularities produced by cutting edges and machine tool feed may be considered roughness. The height is rated in microinches arithmetical average deviation from the mean line: the symbol AA being used as the descriptive abbreviation.

"2-6 Waviness. Irregularities of the nominal surface which are of greater spacing than roughness. These irregularities may result from such factors as machine or work deflections, vibration, heat treatment, or warping strains. The height is rated in inches as the peak-to-valley distance.

"2-8 Lay. The direction of the predominant surface pattern, produced by tool marks or grains of the surface ordinarily determined by the production method used.

"2-9 Flaws. Irregularities which occur at one place, or at relatively infrequent intervals in the

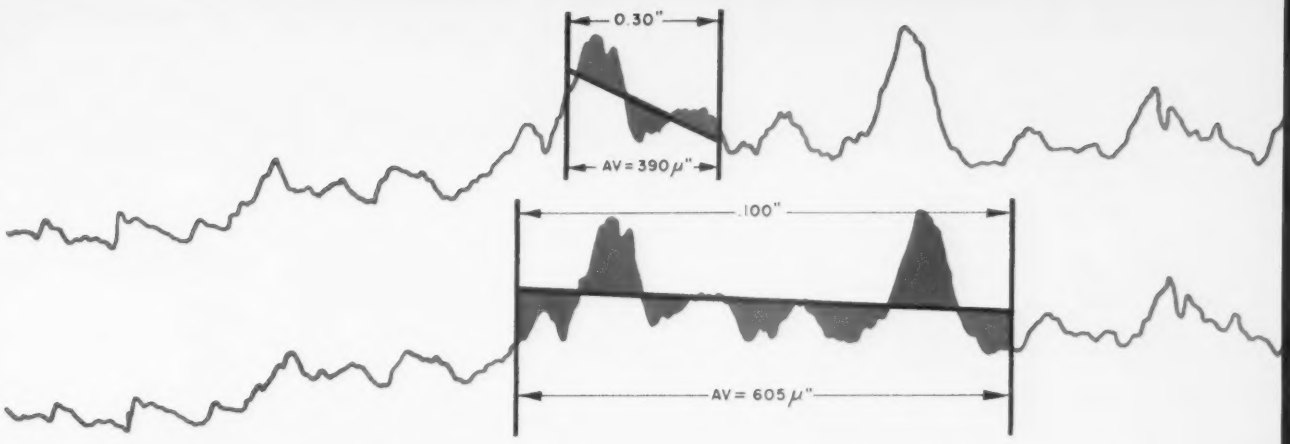


Fig. 2—Width of surface included in measurement affects roughness value as shown by comparison of the standard 0.030-in. cutoff and a 0.100-in. cutoff. The larger cutoff gives a greater average

Casting Surface Roughness

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Plant Manager
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Ann Arbor, Mich.

and

Dr. C. E. McQUISTON
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surface, e.g., a scratch, ridge, hole, peak, crack, or check.

"2-10 Microinch. One millionth of an inch. (0.000001 in.)."

As can be seen in 2-1 the definitions are supposed to be broad enough to include all processing techniques; the illustrations, however, all refer to machined surfaces. On a casting, the predominant surface is produced by the surface of the mold. Various materials are used to make a mold surface, such as bonded sand grains for green and dry sand and shell molds, plaster and investment slurries for precision and specialty molds and machined metal for permanent and die-cast molds. The basic definition as established in the standard would apply to all cast surfaces, regardless of molding media, even though the examples in the definition do not relate to cast surfaces. The same is true of the waviness, lay and flaws. Illustrations of these factors would include shrinkage and nonconformity to the pattern, random lay, gas defects and sand inclusions, respectively.

A typical cast surface profile is shown in Fig. 1A. This is a true surface profile magnified 500 times in both directions. In such a picture it is

Fig. 3—Curve relates microinch roughness value to roughness width cutoff for a specific surface

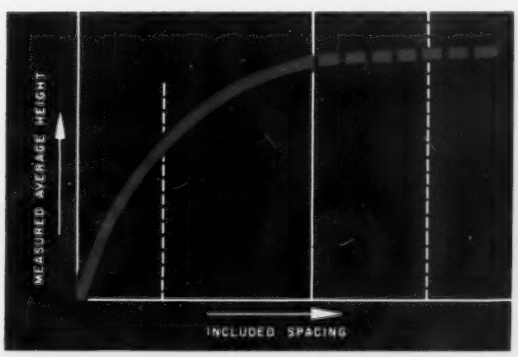

Fig. 4—Visual-tactual comparator shows roughnesses. Rms number for C ratings given in Fig. 5

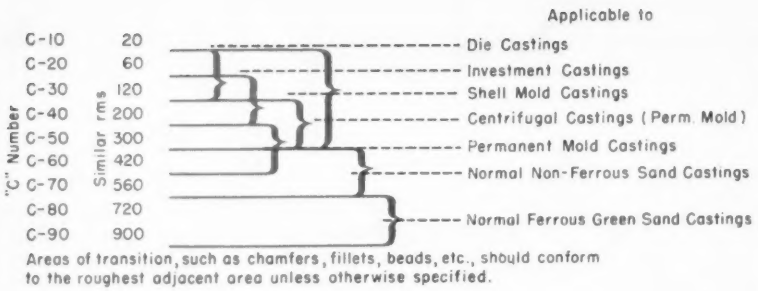

Fig. 5—Equivalent rms designations for C ratings and the approximate range of surfaces which are produced by various casting methods

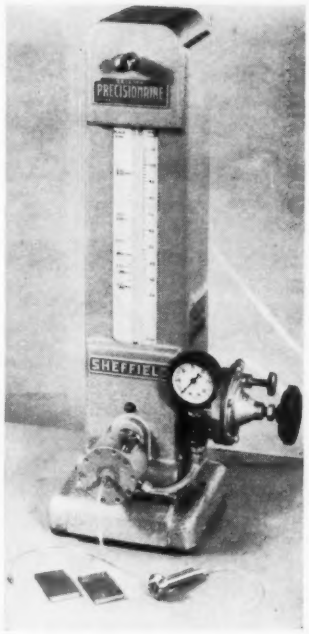

Fig. 6—The air gage instrument provides an easy-to-operate means of surface measurement but is limited to flat or large diameter parts

difficult to appreciate the variations in the surface since the heights of these variations usually are of considerably less magnitude than the spacing differences. For that reason surface profiles usually are modified to accentuate the vertical dimensions with respect to the horizontal spacings as shown in Fig. 1B. Note that the vertical magnification is the same while the horizontal picture has been foreshortened.

What About Cast Surfaces?—If all of these definitions are applicable to cast surfaces, why has it been said that "microinch roughness designations with instruments in current use for measuring other types of surfaces have been found unsatisfactory for specifying finishes on as-cast surfaces."[3] The reason is explained by the roughness width cutoff. This is defined in the ASA Standard as follows:

"2-7 Roughness-Width Cutoff. The maximum width in inches of surface irregularities to be included in the measurement of roughness height. Roughness may be considered as superposed on a wavy surface."

This means that some arbitrary dividing line must be established between roughness and waviness. As stated in the standard, "The value 0.030 in. is preferred for most surfaces and is to be used unless otherwise specified." While this value is satisfactory for machined surfaces, it readily can be seen that there are irregularities in Fig. 1B with spacings in excess of 0.030 in. which would be excluded from the roughness reading if the 0.030 in. cutoff were used. Fig. 2 illustrates the difference that is obtained in using the standard 0.030 in. cutoff value and using a 0.100 in. cutoff value. It can be seen that the average increases for the larger cutoff value. This leads to the general curve shown in Fig. 3 relating microinch roughness value to roughness width cutoff for a specific surface. The solid part of the curve represents the increase in reading as the roughness width cutoff value approaches the maximum roughness width. The dashed section of the curve represents a leveling off of the roughness reading that occurs with any further increase in cutoff.

Cutoff Point Is Important—From this curve it readily can be seen that if the surface measuring instrument is designed to operate at a cutoff greater than the maximum roughness width (the solid vertical line) then the measured average height will be equal to the maximum roughness height, but if the cutoff is less than the maximum roughness width then the measured average height will be something less than the maximum roughness height. This is why it was stated previously that present instruments would not work on cast surfaces since they usually are designed to measure 0.030 in. or less cutoff while many castings have wider spacings.

If the instrument is designed to operate at a 0.100 in. cutoff value, it is apparent that 100 per cent readings will be obtained whether the maximum roughness value is 0.020 or 0.080 in. If, as tests indicate, the maximum roughness width of castings is under 0.100 in. and an instrument can measure up to 0.100 in. spacings, then the instrument would work on all cast surfaces as well as on machined surfaces.

Considerable time has been spent discussing roughness width cutoff since its effects are most noticed and since it is perhaps the most difficult concept of surface finish measurement.

Evaluating Surface Roughness—A method of evaluating surface roughness, by definition, should not evaluate the effects of waviness or flaws since they are caused by different conditions and should be controlled separately. There are certain criteria which should be considered when discussing these various methods, and they are:

1. Is the method suited to all types of cast surfaces; i.e., will it work equally well on sand cast surfaces and die cast surfaces and perhaps

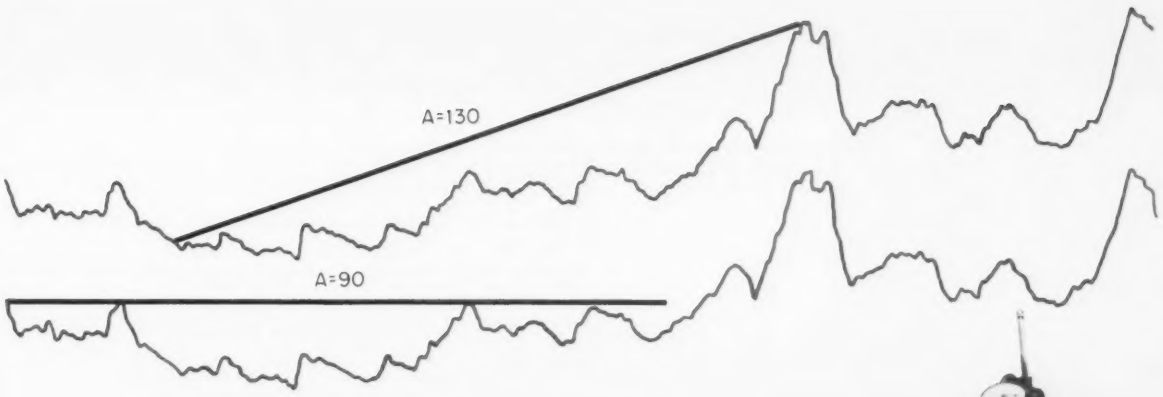

Fig. 7—Placing pickup head of air gage instrument on various areas of same surface gives different readings

Fig. 8—The standard height gage is usable on curved surfaces with a straight segment, such as a cylinder

Fig. 9—This is another height-gaging machine. It was used in obtaining data for this article

give similar results even on machined surfaces?

2. Does the rating of the method correlate with the surface roughness of the part as defined above, or does it merely provide a repeatable figure not necessarily correlated with the roughness?

3. How well is the method able to repeat on the same surface?

4. Can the method be used on a variety of sizes, shape and roughness height parts?

5. Is the method easy to operate?

6. How much human judgment is involved?

These criteria are considered in the following discussion of visual-tactual comparators, air gages, buffing techniques, height gaging and stylus tracer techniques. Other techniques have been applied to the general field of surface measurement, but they are excluded from this discussion since they could not be applied practically to the casting surface measurement.

The visual-tactual comparator shown in Fig. 4 is designed with patches of increasing roughness. These patches are given "C-ratings" which have equivalent rms roughness values as shown in Fig. 5. It is recommended that, when using this system, the drawing of the casting should explain the rms equivalent of a specified "C" number. While the comparator is easy to use and has reasonable correlation with the surface roughness, it is limited by the dependence on human judgment for rating and repeatability.

The air gage instrument illustrated in Fig. 6 eliminates human judgment and provides an easy-to-operate means of measurement. However, the device is limited to flat or large-diameter parts. The air gage measures air escapement from under the pickup head. This air escapement is proportional to the area between the pickup head and the surface to be checked. Fig. 7 shows the same surface in both cases, with the pickup shifted slightly and resulting in the large increase in area. Thus, various readings may be obtained on the same surface. However, if a large number of individual readings are taken and averaged, a representative rating may be obtained.

Other Methods—Neither of the above two uses has been cited by researchers, but since they are adaptable to production checking, they are reviewed here. One of the first techniques reported to the foundry industry was a buffing technique where the weight loss due to buffing was considered as proportionate to the finish.[4] While this assumption probably is valid for duplicate castings, it is very difficult to apply this criteria to castings of varying surface area. Also, the limiting point of the buffing process, when five to ten pits are noticeable on the surface, is not one which is definite. The shortcomings of this technique

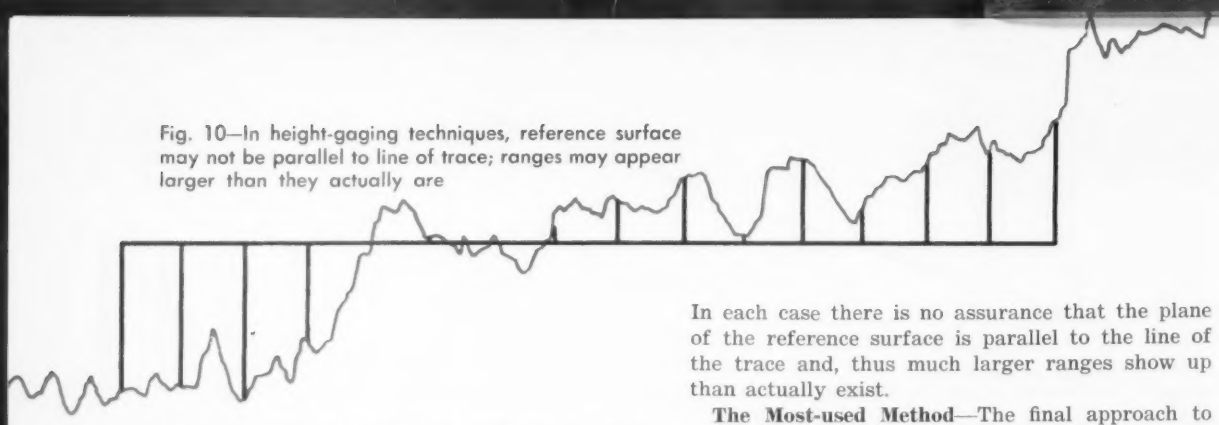

Fig. 10—In height-gaging techniques, reference surface may not be parallel to line of trace; ranges may appear larger than they actually are

readily were recognized and it was not used in later studies.

Another measuring device consists of a dial indicator mounted on a tripod which rests on the surface to be checked and a phonograph needle mounted on the indicator stem so that it can be rotated in a circular path of ½-in. circumference.[5] By measuring a large number of heights around this path and computing the average of these heights the roughness of the surface can be computed. The surfaces are classed according to the following chart:

Class	Symbol	RMS
O	R ¼	0-250
A	R ½	250-500
B	R 1	500-1000
C	R 2	1000-2000
D	R 4	2000-4000
E	R 8	4000-8000

While the device may produce repeatable readings proportionate to surface roughness, the computations limit its application to production checking.

Another technique is the standard height gage on a surface plate illustrated in Fig. 8, with four readings taken at twenty different areas. The average of the ranges of these groups is used as the roughness of the part.[6] This technique is usable on curved surfaces so long as they have a straight segment, such as a cylinder or a cone, but it still requires a large number of calculations.

A third method for this type of measurement is shown in Fig. 9. The instrument was used for taking the true surface profiles used in this paper. There are many desirable features to this machine, but it would not be suited to the production checking of castings. However, it is well suited to research work.

Fig. 10 shows one of the major limitations of any of the above height gaging techniques. In each case there is no assurance that the plane of the reference surface is parallel to the line of the trace and, thus much larger ranges show up than actually exist.

The Most-used Method—The final approach to be discussed is the stylus tracer method. This is the method used by most of the machining industry as indicated in section 4-2 of the ASA standard.

"4-2 Scope. Although a number of instruments for measuring surface roughness have been devised which employ optical, acoustical, mechanical, and pneumatic principles, the large majority of instruments in use for measuring surface roughness depend on electrical amplification of the motion of a stylus perpendicular to the surface over which the stylus is traversed. As other types of instruments are not widely used, this standard is concerned only with tracer type instruments using stylus tracers and electrical amplification."

A typical stylus instrument is shown in Fig. 11. Instruments of this type are direct-reading, easy to operate and will work on all cast and machined surfaces. They measure roughness only and do not include waviness and flaw effect in the measurement. Such instruments have good repeatability and may be used to check a wide range of sizes and shapes, including inside and outside diameters, flats and some irregular shapes.

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Fig. 11—Stylus tracer machines work on all cast surfaces. They measure roughness only, excluding waviness and flaw effect in the measurement

Brass Foundry Salvage Practice

The Brass Foundry as a Book

This article is the last of 27 in Mr. St. John's series discussing the practical side of brass foundry operations. Because of readers' widespread interest in these articles during their publication, FOUNDRY plans to combine them in book form. An announcement will be made as soon as copies of The Brass Foundry are available.

Closing his series on *The Brass Foundry* with article No. 27, Mr. St. John discusses such aspects of salvage practice as segregation of alloys, reclamation processes, and refining

By HARRY ST. JOHN
Foundry Consultant

THE classic example of waste material salvage is the meat packing house, of which it is said that everything but the squeal of the pig is utilized. In the brass foundry also, the difference between profit and loss may lie in its salvage operations. So far as possible, metal-bearing wastes are to be made fit for use in the foundry itself, whereas other, less usable wastes should be so treated as to bring the highest possible price when sold to the smelter.

Although some degree of metal salvage now is practiced generally, it has not always been so. Two instances come to mind. A large brass foundry with no space available for dumping waste sand paid a trucker $6 per load to cart it away. It was found later that more than $6 worth of brass could be extracted at a small cost from each load. Another foundry used spent molding sand for filling purposes. It now operates a profitable "brass mine" and returns nonmetallic waste to the fill.

Downgrading Results in Loss—One of the most serious losses occurs in downgrading of turnings from the machine shop. For example, if turnings from an alloy containing considerable lead become mixed with an alloy in which lead is limited to 2 per cent or less, the mixed turnings cannot be used in the higher grade alloy, but must be used to enrich the lower grade alloy unnecessarily with copper and tin. When there is a difference of several cents per pound in the value of the alloys, such downgrading may involve a substantial sum.

There is no foolproof method of keeping unlike turnings separate. Containers should be tagged for identification, but this precaution will not solve the problem unless machines are cleaned thoroughly after each run and workmen are impressed with the importance of complete separation. In a small establishment with its own machine shop, the matter is not difficult, but where many machines are employed, and particularly when more than one shift is operated, the difficulty sometimes seems almost insurmountable.

Some shops have gone so far as to assign to each shift a man whose sole duty is to see that machines are cleaned and turnings properly tagged. When incompatible turnings are mixed—for instance, aluminum or silicon bronze with a tin bronze or red brass—the foundry has no option but to sell the material to a smelter.

The preparation of turnings for foundry use was discussed in a previous article. If properly prepared, they can be used in some types of melting equipment as the equivalent of composition ingot, pound for pound. For this they must be clean, bright and dry. Turnings wet with oil or cutting compound should be put through a centrifugal separator which will reduce the moisture to about 2 per cent. It will pay to do this even if the turnings are to be sold to a smelter.

After centrifuging, which is properly a machine shop operation, turnings are passed through a long rotary drum with a hot reducing atmosphere which completely removes oil and moisture. If the atmosphere is properly balanced, turnings will be dry and practically untarnished. A piece of paper fed in with the turnings should not be consumed but completely charred.

As the turnings emerge from the drum, they are picked up by an elevator which carries them over a heat-resistant magnetic pulley to remove tramp iron. The brass then is ready for foundry use.

Screen Metal from Sand—Molding sand, during preparation for reuse, is screened to remove pieces of metal and core butts. This mixture should be accumulated for a metal recovery operation which will be described a little later. Since molding sand in process is moist, a relatively coarse screen must be employed: A fine screen would clog quickly and become useless.

As sand is used over and over, it accumulates pellets of metal too small to be removed by the coarse screen. Eventually the sand must be cleaned to make it fit for further use and,

incidentally, to recover the metal. To accomplish this cleaning, a portion of the molding sand can be diverted daily and dried to a moisture content of less than 2 per cent. At this moisture level, practically all of the metal can be removed by passing the sand through a 20-mesh screen.

For this purpose, it is advisable to use a double-deck vibrating screen in which the coarser metal is caught on a 10-mesh screen before the sand reaches the 20-mesh screen; otherwise the finer screen will wear excessively. The recovered metal then goes to the salvage department for further treatment, and the sand is returned to the molding floor.

Foundry floor sweepings are sufficiently dry for immediate screening without further drying. However, these may include large pieces of spilled metal which should be removed by a very coarse screen or by hand picking.

Slag and Skimmings Contain Metal—In some varieties of foundry refuse, metal is so firmly attached to nonmetallic materials that they cannot be separated by screening. Skimmings, as well as discarded crucibles and wornout refractories from ladles and furnace linings, must be crushed and washed before separation becomes possible. Slag removed from hearth-type furnaces is in the same category, as are ashes from a solid fuel such as coal or coke.

Metal-bearing wastes of this type may be fed into a ball mill in which they are tumbled with steel balls and water for a sufficient time to pulverize the nonmetallics. As the material leaves the mill it passes over a coarse screen which removes the larger pieces of metal. The remaining mixture of water with fine metallics and pulverized nonmetallics flows on to a concentrating table which, if properly adjusted, makes a very efficient separation of metal and nonmetallic refuse. The product from the table should, when dry, average 90 to 95 per cent metallic.

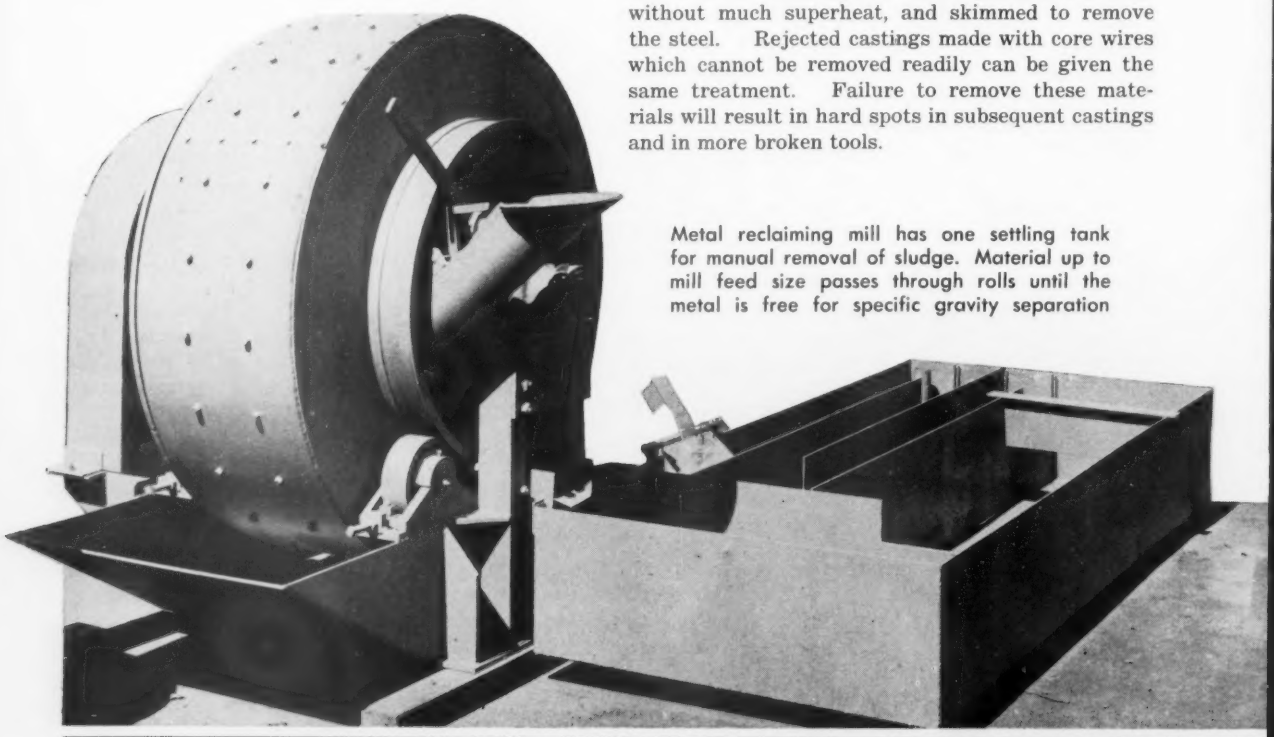
For very heavy material a jaw crusher sometimes is used with an elevator to carry the broken up mixture into the ball mill for final crushing.

The screenings from molding sand and foundry floor sweepings contain cores and other waste material which also can be removed best by the concentrating process just described.

The investment cost for ball mill and concentrating table is not too large for foundries of very moderate size. At somewhat lower cost, a mill is available which combines the functions of ball mill and table and yields a satisfactory concentrate. This equipment is of particular interest to very small foundries in which the more elaborate equipment would be idle much of the time.

Concentrates, if of known and suitable composition, can be returned to the foundry melt. Otherwise they can be sold to smelters at a price which compares favorably with the sale of unconcentrated wastes. In either case the concentrates should be dried and iron removed by passing them through the equipment already described for use with turnings. Since only water is to be removed, the rate of feed through the drier can be substantially greater than that employed for oily turnings.

Salvage from Defective Castings—In certain instances, defective castings require treatment before use in the foundry melt. Oily or greasy castings should be washed by the machine shop before they are returned to the foundry. Castings which contain broken tools should be accumulated, melted without much superheat, and skimmed to remove the steel. Rejected castings made with core wires which cannot be removed readily can be given the same treatment. Failure to remove these materials will result in hard spots in subsequent castings and in more broken tools.



Metal reclaiming mill has one settling tank for manual removal of sludge. Material up to mill feed size passes through rolls until the metal is free for specific gravity separation

In machine shop, containers should be tagged for identification, and machines should be cleaned out thoroughly after each run of an alloy

Some castings are too large to be returned directly to the melting furnaces. With the red alloys, it used to be common practice to place large castings on top of crucible furnaces and heat them to a dull red heat, at which point they became "hot short" and could be broken up with a sledge hammer. A more modern and preferable practice is to cut the castings with a band saw. This treatment is necessary in any case with alloys which are not "hot short." Cutting with a torch is feasible, but not recommended except for very tough metals such as Monel. Cutting also is necessary for risers too large for furnace charging.

The blasting of gates and sprues before remelting was discussed in a previous article. It is not essential, but some authorities hold it to be very desirable. In any case, care should be taken to remove molding sand as completely as possible during cutoff and core knocking operations.

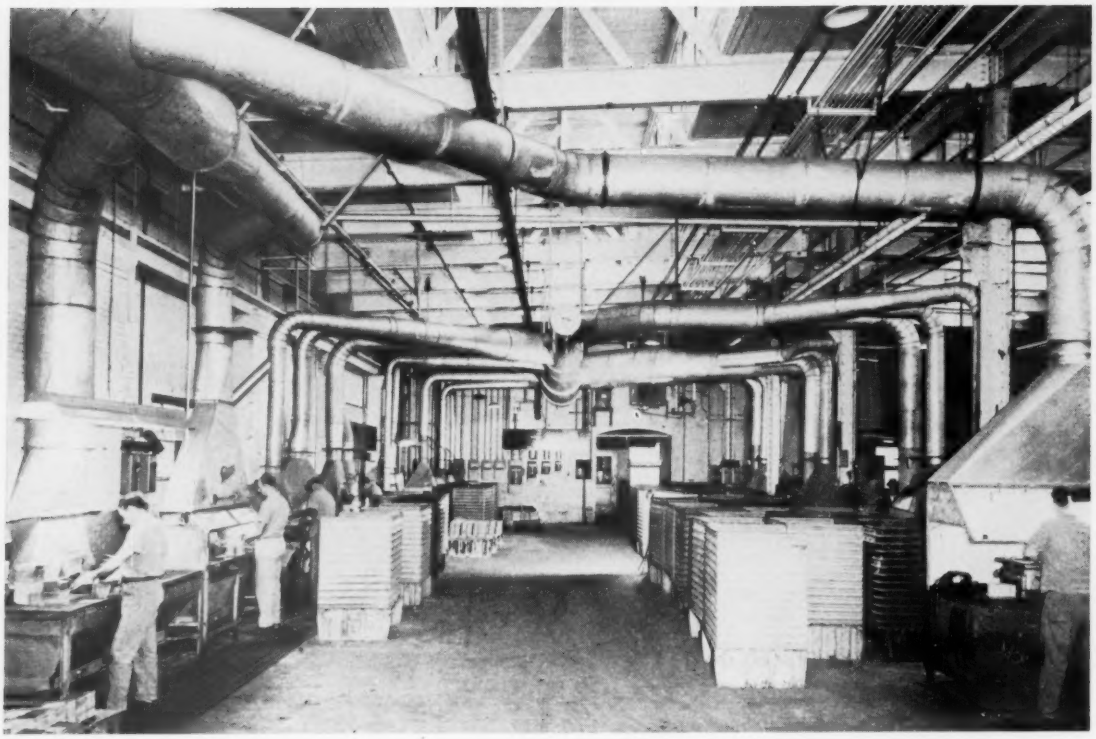
As stated previously, machine turnings and concentrates of unknown or mixed composition may be sold to a smelter at a price commonly based on the copper content, or the smelter may be willing to melt and refine the metal as received, returning the ingot as is, let the composition be what it may.

Some large foundry operators make a practice of doing this for themselves, thereby saving handling and other costs. They may even include such items as grindings and screw machine yellow brass turnings. The resulting ingot is analyzed and suitable additions made when the ingot is used in the foundry. Or it sometimes happens that the foundry has one or more products in which composition is of little importance, in which case the homemade ingot can be used without change.

Ingot Refining Is a Science—It should be remembered that the refining and casting of nonferrous composition ingot is a science in itself and requires specialized knowledge and experience. The foundry which follows such a practice can do so successfully only because it is dealing exclusively with its own materials and is in a position to know that they are not contaminated with undesirable elements. When done by a foundry, ingot making is a melting rather than a smelting operation, although as much as 1 per cent of an oxidizing flux can be used, if desired, to reduce iron and eliminate traces of aluminum or silicon.

Barium sulphate (*blanc fixe*) is suitable for the purpose and can be combined with soda ash for the reduction of sulphur, but this flux attacks the furnace lining severely. The furnace so employed should not be used to melt metal for foundry castings because excessive slag will interfere with efficient melting. In fact, ingot making, including the melting of castings which contain broken tools or core wires, preferably should be carried out in a salvage department, separate from the foundry proper.

Most foundries practice some of the salvage methods described here, and some utilize all of them. There is an opportunity for even the smallest foundry to make a profit by salvaging its waste materials, whether for its own use or to make them more acceptable for sale to a smelter.



Well designed exhaust piping is important. Piping in this battery plant installation is engineered correctly, with sufficient support and proper enclosures at dust source

MAINTENANCE

for Dust Control Systems

Keeping dust control systems in proper operating condition requires a definite and adequate preventive maintenance program. Maintenance should not be delayed until expensive, disruptive breakdowns occur

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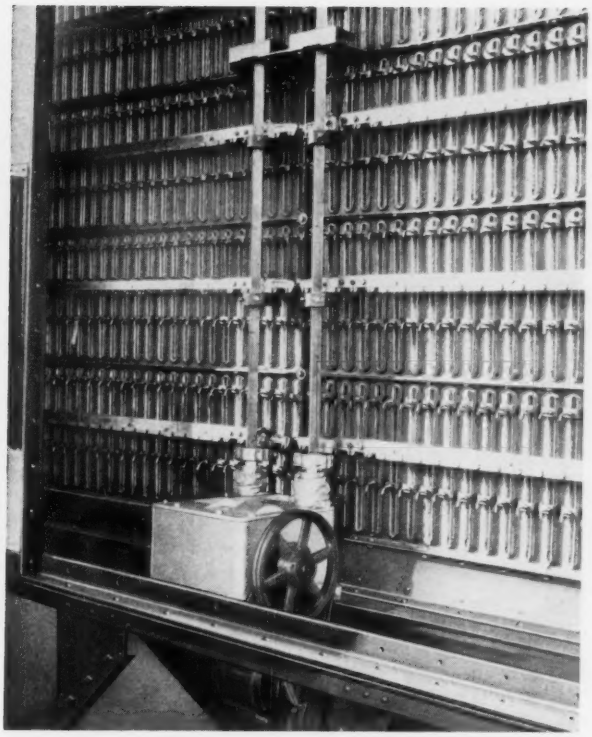
TOO often the attention given to maintaining a dust control system depends on the value of the dust being collected. In a foundry, where the dust generally has no value, there is a tendency to delay maintenance until a major breakdown occurs or nearby workmen or neighbors begin to complain about air pollution or damage caused by dust settling over equipment. When this happens, repairs usually are expensive and often cause downtime on production machines, labor losses and possible civil action.

To avoid this situation, a definite and adequate preventive maintenance program is necessary to keep dust control systems in proper operating condition. This program should cover the entire dust control system, including the dust collector, exhaust hood and piping.

Good Design Aids Maintenance—A good maintenance program should begin with a well engineered dust control system. Points to consider are adequate air volume capacity, air flow resistance, effect of temperature inside and outside



Screen rapping mechanism cleans the accumulated dust from cloth surfaces. Oil level in the rapping unit should be checked at regular intervals

the collector, characteristics and amount of dust to be collected, especially from the standpoint of its abrasive quality, and other specific characteristics that might cause maintenance problems in certain types of dust control systems. If dust is of a high hygroscopic nature, provision must be incorporated to prevent condensation and to keep the material dry.

Adequate capacity should be provided for peak loads that might cause overloading troubles if the system is figured too closely. Improved design often can be obtained in an existing system in gradual steps when the system is undergoing major overhaul.

Often a well designed dust control system is erected under supervision of inexperienced personnel who unknowingly perform an incorrect assembly which may not only reduce efficiency of the system but make it a maintenance problem for its entire life. This procedure is, of course, very costly. All dust collecting installations should be erected under the supervision of an experienced erecting engineer whose services are usually available through the equipment manufacturer.

Piping systems might be poorly installed or incorrectly designed by an inexperienced contractor. This can be avoided by giving the work to contractors who have a reputation for installing satisfactory industrial exhaust piping systems. A few hundred dollars saved in the cost of piping installation might defeat the effectiveness of a dust collector which has cost many thousands of dollars.

A dust collector should be located in an accessible location to make it readily available to the maintenance crew. Adequate access facilities should also be provided for inspection and servicing the various check points and clean-out openings.

The first requirement of a good maintenance program is periodic inspection of the dust control system. Consultation with the manufacturer plus practical experience of your maintenance engineer will provide the basis for a thorough, periodic inspection. Periodic maintenance inspection should be divided into two separate procedures. One procedure should be set up for the entire system, while the other should be set up for the dust collector proper.

The Entire System Procedure—1. Inspect each exhaust hood and branch pipe individually, repairing any damage or deformation, as well as replacing worn skirts and flaps and making sure in-

DAILY MAINTENANCE CHECK LIST

Intermittent Cloth Type

Inspector:_____

Time:_____

Check Points:_____

1. Is exhauster stopped before starting cloth mechanism?
   Yes_____ No_____
2. Cloth cleaned?
   1st Shift_____a.m.-p.m.
   2nd Shift_____a.m.-p.m.
   3rd Shift_____a.m.-p.m.
3. Hoppers emptied?
   1st Shift_____a.m.-p.m.
   2nd Shift_____a.m.-p.m.
   3rd Shift_____a.m.-p.m.
4. Hopper dust discharge tubes or gates closed?
   Yes_____ No_____
5. Exhauster and cloth cleaning mechanism drive operating properly?
   Yes_____ No_____
6. On multiple section continuous operating collectors make sure air control dampers, drives and controls functioning properly.
   Condition _____

Reverse Air Cleaning Type

1. Inspect moving parts of reverse air manifold and mechanism to be sure operating parts are in good condition and adjusted and operating according to manufacturer's instructions.
   Condition _____
2. Read permanent water gage. Be sure static loss through collector is maintained at normal, as recommended by manufacturer.
   Reading _____
3. Hoppers emptied?
   1st Shift_____a.m.-p.m.
   2nd Shift_____a.m.-p.m.
   3rd Shift_____a.m.-p.m.
4. Are gates or tubes in hopper discharge closed during collector operation?
   Closed? _____
5. Report any unusual conditions found that affect good operation or proper maintenance.

spection and access doors and windows are tight.

2. Check and repair piping system, joints and connections for breaks or leakage.

3. Inspect piping system for dust settlement within the piping, removing accumulation when found.

4. Make sure blast gates, dampers or orifice plates are not worn and are correctly set.

Procedure for Collector Only—A suggested weekly check list for intermittent cloth collectors follows:

1. Make sure exhauster is stopped before cloth cleaning mechanism is started. The system should be wired to stop exhauster before the cloth cleaning mechanism is started, and vice-versa.

2. Cloth is to be cleaned after each four hours of operation, more frequently for abnormal dust conditions. Normal length of time for cloth cleaning is 3 to 5 minutes.

3. Dust is to be removed from collector hoppers after each cloth cleaning. Dust must not be permitted to accumulate higher than one half the depth of collector hopper.

4. Canvas tubes or other gates or attachments at bottom of hopper must be closed before exhauster is started up, and kept closed during collector operation.

5. All moving parts of cloth-cleaning mechanism should be checked for wear and kept in first-class operating condition.

6. Bolts or means of holding and sealing dust collector bags or screens in place should be kept tight at all times to avoid leakage.

7. Casing joints should be inspected for air, dust or water leakage. Be sure paint on roof of collector is in good condition to prevent water seepage around bolts and rusting of collector casing.

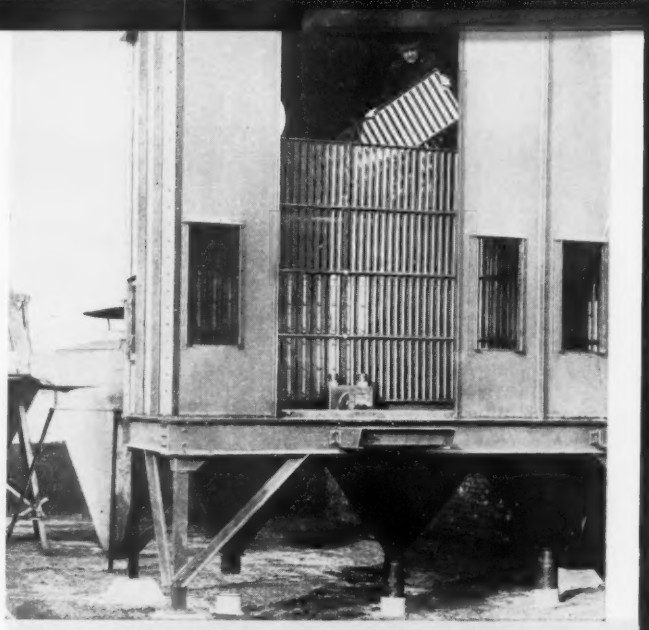
8. Proper oil level or grease should be maintained in the cloth cleaning mechanism at all times. Use grade oil or grease as recommended by manufacturer.

9. Check fan for wear, excess vibration and correct rotation. Be sure V-belt drive is not slipping and belts are in good condition. Lubricate impeller bearings.

10. Check static pressure loss across collector. This loss will vary between 1½ to 3 in. water gage under normal operating conditions after cloth cleaning. Reading should be taken immediately after cloth cleaning.

11. If collector is multiple sectional continuous operating type, carefully inspect air control dampers, their operating mechanisms and the timing and control apparatus. Collector should be run through a complete cycle to check proper functioning of all parts.

Continuous Cloth Collectors—The same inspection procedure as above can be followed for this collector except for those items involving the cloth cleaning mechanism. The dust is removed from the cloth of this type collector by reverse air flow. This mechanism should be checked periodically as follows:



Grid partitions should be installed from bottom row and built up. Joints should be calked and bolted securely and painted on dust side

1. Inspect all parts of reverse air manifold traverse mechanism for proper operation and/or wear.

2. Check wire rope and roller chain for proper alignment and tension.

3. Check reverse air manifold seal for wear and proper clearance.

4. Be sure reverse air manifold travel limits and switching mechanism are properly adjusted and in good working order.

5. Check manifold and reverse air blower drives for proper operation.

6. Operate collector through a complete cycle to check proper functioning of all parts according to manufacturer's operating instructions.

7. For a normal 8-hr day operation, manifold rollers, manifold drive motor, manifold blower motor, exhauster motor and exhauster bearings should be lubricated monthly with high-pressure ball bearing grease. Wire rope sheaves and roller chain should be oiled with SAE No. 10 motor oil or a light machine oil. Reducer and motor should be checked and provided with oil per manufacturer's recommendation. Lubricate fan impeller bearings.

8. Take water gage reading to determine static loss across collector. Normal static loss across screens is 1½ to 4 in., water gage varying according to type of dust being collected.

Wet Dust Collectors—The centrifugal tower or counter-current wet collector must be supplied with an adequate flow of clean water for proper functioning. A clean water supply reduces maintenance cleaning of the collector. Where a water recirculation system is used, adequate settling tanks based on settling time of the dust handled must be provided.

The following should be inspected and serviced

To assure dusttight connections of filter bags on cloth-bag dust collector, sealing attachments should be inspected often

as required at regularly scheduled intervals:

1. Interior of collector, including inlet and outlet connections, removing any excessive accumulation of material and thoroughly flushing and cleaning as required.
2. Collector to be repainted inside and outside regularly.
3. Water supply piping, valves, fittings, pressure switches, etc.
4. Drain piping, valves, fittings, etc.
5. Fan should not be operated unless water is flowing through collector. Whenever fan is shut down, water should be allowed to flow through collector for about ½-hr to flush out the collector.
6. Inspect and clean any accumulation in fan housing and wheel. Be sure housing drain is open.
7. Check fan speed and rotation; tighten V-belts if necessary; check and lubricate bearings.
8. Inspect, clean and lubricate recirculating water pump, drive and motor.

The concurrent type wet collector must have regular attention and be operated in accordance with manufacturer's instructions to insure proper performance and long life. Water must be drained from the collector at regular intervals. The cleaning interval will vary with each installation depending on quantity and kind of material.

At least once each week (more frequently for severe conditions or duty) the following inspection and cleaning schedule is recommended:

1. Inspect, clean and flush out any accumulation on interior of collector, including venturi tubes or baffles, water entrainment section and baffles, inlet and outlet connections, etc.
2. Drain water from collector, clean and flush interior and sludge retention baffles or louvers.
3. Inspect, clean and flush water level controls, piping, fittings, valves, etc. Be sure water level control collars are properly set and fastened.
4. Repaint inside and outside of collector when necessary.
5. Inspect and check water supply piping, valves, fittings, strainers, pressure switch, run orifice, etc. Make sure water supply is turned on whenever fan is started.
6. Inspect and clean any accumulation in fan housing and wheel. Be sure housing drain is open.
7. Check fan speed and rotation; tighten V-belts if necessary; check and lubricate fan and motor bearings.

Sludge Settling Tanks—1. Sludge settling tanks for wet collectors must be properly operated and maintained. Under no circumstances should the settling chamber of dewatering tanks be allowed to fill with sludge. Sludge and silt must be removed at regular intervals and the tank cleaned and maintained in accordance with instructions.

2. Integral or separate settling tanks with chain drag conveyors should be equipped with timers to operate the conveyor for a sufficient period of time after the collector is shut down to remove the accumulated sludge in the tank.
3. The tank should be repainted inside and outside regularly.
4. Piping, valves, fittings, water level controls, etc., should be checked and cleaned regularly.
5. Pumps for recirculating water from sludge settling tanks should be inspected, cleaned and lubricated and worn parts replaced.
6. Pump drive and motor should be inspected, cleaned and lubricated.

A maintenance check list should be used to provide positive checking and written records. This list should indicate the part and location of each check point, the time to be inspected, a record of when it was inspected, the name of the inspector as well as information regarding parts replaced. Such a check list not only insures regular and proper maintenance but also provides management with a record from which to determine efficiency and maintenance cost.

Maintenance Organization—Responsibility for maintenance of dust control system should be assigned to one reliable man and his crew. This man and his crew will become familiar with the system to the extent they can readily detect trouble. Maintenance personnel should have proper tools and instruments available.

Production personnel should receive instructions regarding what to look for when the system is not functioning properly. This will permit production personnel to detect when the system is operating improperly and they in turn will notify maintenance personnel so that it can be corrected. Production personnel should be instructed not to throw paper, cigarettes, cloth or other harmful material into the hood. Refuse material may clog the piping or the collector. Lighted cigarettes may burn up the cloth in a dry collector.

Spare parts for emergency repairs should be available to hold shutdowns to the minimum.

Questions and Answers

Difficulty with metal flow in soil pipe castings may be due to incorrect gating practice . . . Indicates anodizing methods for aluminum . . . Use bands in snap flasks . . . Feeding needed to eliminate shrinkage trouble

Method for Gating Soil Pipe

QUESTION In our foundry in India we are trying to cast rain water pipes 6 ft long in 3 to 5-in ID and 3⅜ to 5¼-in. OD. The difficulty we experience is that the molten iron does not flow throughout the entire length.

ANSWER You do not mention anything on the method of gating your rain water pipes, and we suspect that the difficulty lies in that. In this country such pipe up to 6 in. in diam are made two in a mold with a long runner between them in the cope mold. Thin flat gates spaced about 2 in. apart lead from the runner to the castings. Usually four sprues equidistantly spaced are provided for entry of the molten metal which is poured from a "bathtub" or elongated ladle with four lips spaced the same as the sprues. In one foundry only two sprues, one at each end of the runner, are used and the mold filled from two ladles.

Aluminum Anodizing Methods

QUESTION We would like to obtain information on anodizing aluminum alloy castings and will appreciate any help. Are there any firms which do this commercially?

ANSWER Anodizing is the procedure of developing an oxide coating on aluminum by electrolytic means. In the process the aluminum is made the anode and the electrolyte is a material which yields oxygen. A variety of agents is employed in anodizing aluminum. They include phosphoric, oxalic, boric, sulphamic, chromic and sulfuric acids. The last two appear to be most commonly used.

The work to be anodized must be cleaned prior to the operation to insure even, uniform coatings. Usual procedure is to employ hot, mild alkaline solution followed by rinsing in clear cold water. Any coating of grease, wax or dirt which is not readily saponifiable in the alkaline solution first must be removed by suitable means such as vapor degreasing.

In one process, the cleaned work is made the anode in a 5 to 10 per cent solution of chromic acid at 95° F and a low voltage applied initially. Voltage is increased to 40 v as rapidly as possible, which usually takes about 5 minutes. Work is held at 40 v for 30 minutes, removed from the tank and rinsed in cold running water to remove excess acid. Coating is sealed by immersing in hot water at 180 to 200° F for 15 to 20 minutes.

Steps for the sulfuric acid process are similar except that the solution is 10 to 25 per cent sulfuric acid at about 70° F and the voltage is 15 to 20 v. Time may vary from 20 to 30 minutes. Film likewise is sealed in hot water.

The oxide films may be dyed in different colors by use of suitable dyes. If coloring is desired the procedure is slightly different. The work after anodizing is rinsed in cold water, immersed in the hot dye bath for 15 to 20 minutes, and rinsed thoroughly in cold water. Work is oven dried at 180 to 190° F, and then sealed by immersion in a nickel acetate-acetic acid bath for 15 to 20 minutes. Rinsing in hot water and drying follows. It is our understanding that some of these procedures may be patented, and we suggest that you investigate that phase before proceeding.

A number of firms are engaged commercially in jobbing or contract anodizing and we are forwarding the names of some in your area which indicate they do such work.

Should Hire Foundry Engineer

QUESTION We are considering the establishment of a small foundry in our city in India and would like to have an approximate estimation to start one with a capacity of 50 tons of cast iron operating 25 days a month and 8 hours a day.

ANSWER Your question requires the service of a foundry engineer or consultant, and to supply an answer he would have to have information on the type and size of castings to be produced, whether or not molding machines would be employed, etc. About all we can do is offer some generalities.

Presumably your proposed 50-ton capacity means monthly, or 2 tons daily based on 25 working days. Some information indicates production of gray iron averages 35 to 40 lb per manhour, but in your case it may be considerably less because of such factors as skill of the operators, equipment available, etc. If one assumes that your average production rate will be 25 lb per manhour, then 20 employees would be required to produce 2 tons of castings per day. About one-fourth of those workers would be molders, with the remainder in other departments such as cupola, core, cleaning, etc.

Floor space requirements in a foundry vary directly with size of the castings produced. An average figure sometimes used is 8.5 sq ft per ton of good castings per year which in the case of your 600 tons would require a structure providing 5100 sq ft. As mentioned earlier, however, the question with as much information as possible on the project should be placed in the hands of someone with foundry engineering experience. He then can determine foundry procedures, equipment, building, etc.

Using Bands on Snap Flasks

QUESTION We are making some small castings in two sizes of snap flasks using aluminum slip jackets. However, we have shifts and are thinking of placing steel bands in the flasks to eliminate the shifting. We understand that the bands are inserted in the cope and are suspended by four metal hangers attached to each corner of the flask. We wonder if the bands could be placed in the drag but believe that they might ride or fall to the bottom.

ANSWER So far as we know the steel bands used in snap flasks are straight sided and the measurements are such that they make a reasonably tight fit inside the flask without need for holding devices. In operation the flask is placed on the bench or machine joint side up and the steel band pushed in partly or all the way. Then the flask is set on the pattern which means that the band rests on the pattern board. Sand is rammed in position and will hold the band

tightly in place even on jolt-type molding machines. When the flask is unsnapped the band is around the joint line.

Such bands are used to keep the sand from squeezing out or breaking off at the outer edges after the flask is removed or from being pushed out by pressure of the metal poured into the cavity. Generally the band is used in the drag since in many cases the mold cavity or most of it is in the drag. However, there is no reason why the band cannot be used in both halves. While the use of bands will prevent shifts resulting from outward movement of the sand, it will not eliminate those due to actual displacement of the cope in relation to the drag due to slight movement in carrying the mold from bench or machine to the pouring area. That will have to be corrected by closer attention to handling. Possibly it might be well to examine pins and bushing on flasks and patterns to see that they are not worn, and that they function properly.

Iron Castings Exhibit Shrink

QUESTION We are sending four small chunky gray iron castings which show a defect under the gate and will appreciate an opinion on the type and cause of the defect. Iron contains 2.40 to 2.50 per cent Si, 3.45 to 3.55 per cent TC, 0.80 per cent Mn, 0.14 per cent P and is poured in the range 2650 to 2700° F. Sand contains 5 per cent seacoal and has an AFS grain fineness of 100. Castings are all in the drag with a generous feeder located 5/8-in. from them.

ANSWER The defect in the four castings is a shrink caused by lack of feeding. The remedy is to change the gating to give proper feeding. While you mention a generous feeder 5/8-in. from the casting, we gather you refer to the runner and not to a riser since small castings similar to the ones in question commonly are made satisfactorily without risers, particularly with high carbon equivalent iron. In such cases the runner serves as the riser or sources of feed during solidification and consequently must be of such cross-sectional area that it solidifies after the casting. Additionally, the gates connecting the runner to the mold cavity must be designed so that they do not freeze off before the casting is solidified, and that is accomplished by making them as short and compact as possible.

You do not state the dimension of the runner, but we suggest using

Small casting with shrink under gate

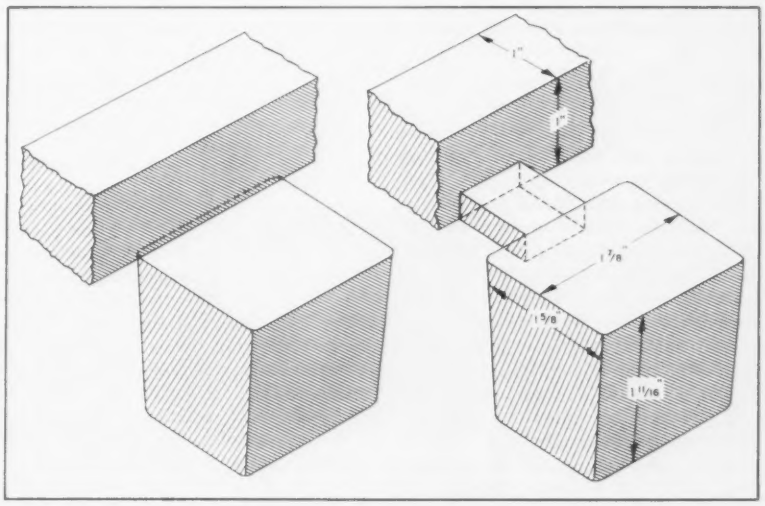
one about 1 in. square which will have a lower cooling rate than the casting. We would try your present gates into the casting to see whether the iron flowing through will heat them sufficiently to create a hot spot which will permit the flow of metal until the casting has solidified. If not you will have to experiment to find a suitable size.

Probably the best procedure is to use a 1-in. square runner in the cope which extends along and overhangs the full edge of the longest dimension of the casting. The attachment between runner and casting becomes a narrow slot, preferably 1/16-in. wide but not over 3/32-in. The narrow slot will feed the casting without difficulty, and the runner and casting can be separated easily by a sharp blow.

Penetration and Gassy Metal

QUESTION In pouring 80-10-10 brass we are having trouble with penetration into the mold, and we would like to know what can be used in the sand to prevent it. When the castings are poured, the outside surface looks all right, but when they are machined, porosity shows up all through the casting. We have tried nitrogen to degass the metal but find it is not satisfactory. We also have tried different types of gates and risers, but the risers puff up instead of shrinking down.

ANSWER As you undoubtedly know, high-lead copper-base alloys are noted for their tendency to penetrate into relatively minute openings. One remedy is to use sand with the finest possible grain size which will not result in trouble from blows. Fineness range may be from 150 to 230, and the most satisfactory number will



Sketches indicating suggested gating methods. Left is Connor, sometimes called the "kiss", gate. Right employs large runner to act as a feeder

have to be determined by experiment. Usually with those alloys the mold face is coated with graphite to fill the surface pores with a refractory material. It might be worthwhile, if the condition is bad, to experiment with zircon sand facing or use of zircon flour washes.

Your second problem of porosity revealed after machining, and particularly of metal backing up or puffing up in the risers, indicates an extremely gassy metal and suggests that close attention to melting conditions is a must item on your agenda. Correction of the trouble at the source is preferable to trying remedies on the affected metal. While no information is available, it appears logical to suspect that the metal is being melted under reducing conditions —that is, using a smoky flame. That condition calls for an adjustment to increase the air or reduce the fuel.

Furnace atmosphere preferably should be neutral, but a slightly oxidizing one will serve satisfactorily. Proper method of ascertaining the atmosphere condition is to use the simple Orsat gas analysis apparatus or similar unit, but a rough idea may be gained by inserting a cold, clean piece of slab zinc in the flame for a few seconds. If soot is deposited, the flame is reducing; if the zinc remains bright and clean, the flame is neutral, and if a yellowish deposit forms, the flame is oxidizing.

You mention that you tried nitrogen degassing but it was not satisfactory. Possibly some detail was overlooked. It might be that the nitrogen used was not dry, and instead of removing gases, the quantity was increased through moisture in the nitrogen. Again it might be that the injection tube was not thoroughly preheated to drive off any moisture. Perhaps the nitrogen was not injected long enough to do the job. One method recommended for checking the progress of any degasification procedure is to pour chunky test plugs and observe whether or not the top shrinks down or pipes properly. A plug 1½ or 2 in. in diam and 4 or 5 in. long should serve.

In addition to nitrogen degasification, such materials as copper oxide and lithium are being used with satisfactory results to remove gases from copper-base alloys.

Suggests a Change in Gating

QUESTION We are forwarding for your attention a section cut from a bronze cylinder poured in our foundry which typifies a defect which we encounter with sufficient frequency in this type as well as other bronze castings to be of considerable concern. Section was taken from a cylinder about 10½ in. OD, 14 in. long, with a 1⅝-in. wall thickness. About ¼ in. has been machined off the OD and ID. Mold is green sand, using a core to form the ID. Casting is poured on end and gated into a riser on top of the mold. Alloy is 85-5-5-5 deoxidized with phosphor copper, and pouring temperature is 2050° F.

Shrinky areas appear in bronze cylinder casting after machining cuts are taken

ANSWER The defect in this particular specimen is a shrinkage cavity undoubtedly developed by lack of feeding. If the defective portions of other types of castings have an identical appearance, the source is similar and changes in gating and feeding will have to be made to eliminate the trouble. In the case of the cylinder, you mention that gating is into a riser on top of the casting but do not describe the method of attachment of the riser. Use of a riser is not a guarantee of a sound casting. As you know, it must be placed as closely as possible to the section to be fed and attached so that it solidifies last.

Since the cylinder is poured in the vertical position, we suggest the application of a ring basin over the casting with six ¼-in.-diam pencil gates equidistantly spaced. Gates should be centered between the ID and OD with the mold level so that the metal drops straight without impingement on the walls. Extension of the cylinder about 1½ in. will provide sufficient riser.

Keeping the pencil gates as short as possible may provide proper feeding without need of extension of the cylinder length. We also suggest that a runner basin be built from the ring to the edge of the mold.

Hard Edges Occur on Castings

QUESTION We are having some difficulty with hard edges on some small castings which the customer machines all over and then heat treats to harden them. Average composition of the iron is 1.65 per cent Si, 3.25 per cent TC, 0.80 per cent Mn, 0.17 per cent P, 0.30 per cent Cr and 0.65 per cent Ni. Castings are ⅞-in. thick, 3 in. on a side with a 1½ in. hole in the center. Heat treatment consists of heating to 1575° F, holding for 12 to 15 minutes, quenching in oil, tempering 1 hr at 300° F and cooling in air. After heat treatment Brinell is from 477 to 512 .We have tried annealing at 1650° F, but the customer states that the desired hardness cannot be obtained.

ANSWER We believe that your difficulty with hard edges on these castings can be overcome by ladle additions of one of the numerous proprietary graphitizing agents on the market, coarse graphite or powdered ferrosilicon. For satisfactory results a wedge bar for control purposes is desirable since it will indicate the chilling tendency of the iron. Amount of chill measured from the tip of the wedge can be correlated with the occurrence of chilled edges in the castings and with the amount of graphitizing agent to be added to reduce the tendency. Possibly with wedge bar control, ladles of iron sufficiently low in chilling tendency could be selected without recourse to ladle additions.

As far as your annealing test was concerned, the high temperature and presumably slow cooling undoubtedly led to considerable graphitization, and no temperature short of melting can bring the graphite into solution again. You will have to select the lowest possible temperature at which the hard edges can be eliminated without affecting following treatments.

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Circle 620 on Inquiry Card—Page 51

Men of Industry

● DR. W. KENNETH BOCK
. . . director of research

● K. A. LANG
. . . Lindberg plant mgr.

● A. F. ANZLOVAR
. . . Mercast Mfg. executive

● DANIEL R. CHESTER
. . . core binder mgr.

DR. W. Kenneth Bock has been named director of research, National Malleable & Steel Castings Co., Cleveland, succeeding the late Harold H. Johnson. Dr. Bock was graduated from Case Institute of Technology and received his master's and doctor's degrees there. He joined National Malleable's research laboratory in 1935 and for the last 4 years has been manager of metallurgical research. Previously he was associated with Bishop & Babcock Mfg. Co., Cleveland.

William L. Congleton has been named production control superintendent, Danville, Ill., plant, Central Foundry Division, General Motors Corp. Formerly general foreman in the inspection department, he succeeds **Arthur P. Siewert,** who has been transferred to the Defiance, O., plant as foundry superintendent. **Harold LeConte** has been named coreroom superintendent at Danville. He was formerly general foreman in the crankshaft department there.

J. P. Henry, formerly general sales manager, has been appointed vice president-general manager, Ampco Metal Inc., Milwaukee. He joined the company's sales department in 1940.

Bernard J. Beierla has been appointed chief metallurgist, Springfield Foundry Co., Indian Orchard, Mass., in charge of metallurgy, sand, and quality control. For the last 17 years he held a similar position with E. W. Bliss Co., Toledo, Ohio.

● **K. A. Lang,** for the past 10 years manager of the Lindberg-Fisher Melting Division, Lindberg Engineering Co., Chicago, has been appointed general manager of the company's plant in Downey, Calif. He will also be responsible for sales activities in the Downey, San Francisco, Seattle, and Denver offices, which cover the western states. Mr. Lang joined Lindberg over 20 years ago.

● **A. F. Anzlovar,** until recently vice president in charge of merchandising, has been named vice president-general manager, Mercast Mfg. Corp., La Verne, Calif., subsidiary of Mercast Corp. of California, affiliate of Atlas Corp., New York. Prior to joining Mercast Mfg. Corp. in 1955, Mr. Anzlovar assisted in the organization of Industrial Metal Castings Co., Cleveland, which later became Mercast Mfg. Corp.

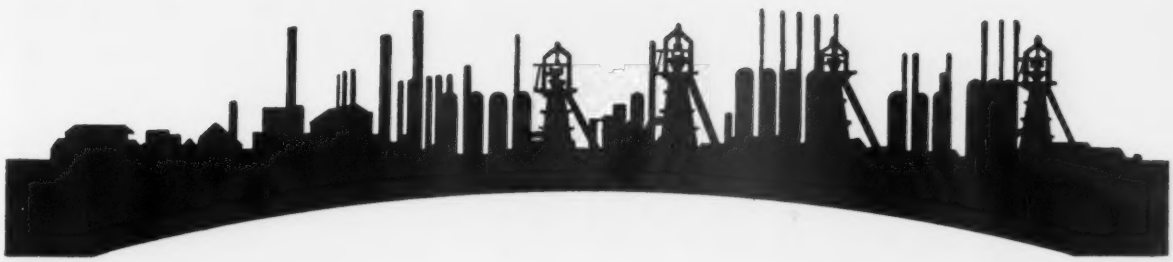
Edmund Sylvester, former president, Griffin Wheel Co., Chicago, has been elected president, American Ship Building Co., Cleveland. He joined American Steel Foundries as a research engineer in 1937 and in 1940 was assigned to the engineering department of Griffin Wheel Co., a subsidiary, where he became executive vice president in 1950 and president in 1953. Mr. Sylvester invented the pressure pouring technique for making cast steel car wheels for railroads, and in 1955 he left Griffin Wheel and started a company in the Union of South Africa to make cast wheels by this method. He has also worked as a consulting engineer.

● **Daniel R. Chester,** formerly manager of technical service, has been appointed manager, core binders, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, responsible for the planning, direction and control of all technical formulation and service having to do with core oils, liquid parting compounds, air setting binders, and silicate-based binders. A graduate of Western Reserve University, he joined the company in 1945. Mr. Chester is presently serving on the Core Test Committee, Sand Division, of the AFS.

Donald L. Colwell has been elected vice president in charge of laboratories and research, Apex Smelting Co., Chicago. Associated with the company for 12 years, he was formerly director of laboratories. Mr. Colwell has been active in technical society work, as chairman of local branches in Chicago of the ASM, AIME, and ASTM. He is chairman pro tem of the proposed new division of diecasting and permanent mold of the AFS.

Carl O. Knierim, recently chief engineer for the Industrial Furnace Division, Gas Machinery Co., Cleveland, has been appointed manager of heat treat sales for the company. He joined Gas Machinery 16 years ago.

Herbert H. Rogge has been named president, American Car & Foundry Division, ACF Industries Inc., New York, succeeding **Samuel M. Felton,** retired. Mr. Rogge, formerly executive vice president, joined the com-



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Woodward Iron Company

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Circle 621 on Inquiry Card—Page 51

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Circle 622 on Inquiry Card—Page 51

● DR. LYMAN R. FINK
. . . GE x-ray dept. mgr.

● CLYDE L. FREAR
. . . leaves Navy Bureau

● WILLIAM R. OAKLEY
. . . Delhi Sand v. p.

● R. D. BRADFORD
. . . heads Federated Metals

pany last year. Previously he was with Westinghouse Electric Corp., Pittsburgh, and from 1950 to 1956 was president, Canadian Westinghouse Co. Ltd., Hamilton, Ont.

● **Dr. Lyman R. Fink** has been appointed general manager of the X-ray Department, General Electric Co., Milwaukee, succeeding **John H. Smith,** who resigned recently after 10 years of service to accept a post on the faculty of the University of Wisconsin School of Business Administration, Milwaukee. Dr. Fink joined the company in 1937 and held various posts in engineering development. Since 1955 he has been manager of research application at the GE Research Laboratory in Schenectady, N. Y.

Albert G. Galler has been appointed field engineer in the Teterboro, N. J., office, Norton Co., Worcester, Mass. **Winfield J. Scott** has been named abrasive engineer in Chicago. They recently completed the company's sales training course.

Joseph L. Mullin has been named executive vice president, American Manganese Steel Division, American Brake Shoe Co., Chicago Hgts., Ill. He has been division vice president since 1945. Other appointments within the division include: **W. Frank Kelly,** vice president-operations; **John E. Holtman,** assistant vice president-operations; and **William E. Crocombe Jr.,** assistant vice president-sales. Mr. Kelly has been assistant vice president of the division since 1952. Mr. Holtman was formerly division works manager, and Mr. Crocombe has been central sales manager since 1954.

George C. Campbell has been appointed Michigan representative, City Pattern & Foundry Co., South Bend, Ind. **James H. Kemp** will represent the company in the Ohio area.

● **Clyde L. Frear,** since 1951 production engineer of the foundry and pattern shop, industrial engineering group, Management Planning and Review Branch, U. S. Navy Bureau of Ships, Washington, retired recently. He will engage in foundry consulting practice. Mr. Frear was graduated from Syracuse University and Queen's University, Ontario. He joined the Bureau of Ships in 1939, and until 1951 was materials engineer in technical charge of castings for the Welding, Casting and Forging Branch.

● **William R. Oakley** was recently appointed vice president, Delhi Foundry Sand Co., Cincinnati. He attended University of Cincinnati and for over 10 years was associated with Griffin Wheel Co., subsidiary of American Steel Foundries, Chicago. He joined the sales staff of Delhi Foundry Sand Co. in 1954. Mr. Oakley is a director of the Cincinnati Chapter of the AFS.

Robert G. Allen, formerly president of Borg-Warner's Pesco Products Division, Bedford, O., and Wooster Division, Wooster, O., has been elected a vice president, Bucyrus-Erie Co., South Milwaukee, Wis. Previously he was vice president, Great Lakes Carbon Corp., New York, and general manager of its electrode division.

William H. Santschi has been appointed associate director of research-fabrication metallurgy, Beryllium Corp., Reading, Pa. Until recently he was supervising metallurgist, Allegheny Ludlum Steel Corp., plant, West Leechburg, Pa. **Kenneth B. Higbie,** formerly commodity specialist for beryllium with the U. S. Bureau of Mines, Washington, is now associate director of research-process and extractive chemistry and metallurgy for the company.

● **R. D. Bradford** has been placed in charge of Federated Metals Division, American Smelting & Refining Co., New York. He joined American Smelting in 1926 as a junior metallurgist, and following management positions in company plants in Utah, Montana, and California, became general manager of the western department in 1951. A year later he went to New York as a vice president of the company, and became a director this year.

Stanley M. Norwood has been appointed assistant to the president, Electro Metallurgical Co., division of Union Carbide Corp., New York, continuing as vice president of the division. Associated with Union Carbide since 1917, he has devoted his time to sales and technical development with Electromet since 1927. In 1944 he was made vice president in charge of technical service and development and recently was responsible for organizing the marketing research division of the sales department.

Don Palmisano, formerly Birmingham sales representative, Electrode Division, Great Lakes Carbon Corp., New York, has been transferred to the new office recently opened by the division in Kansas City, Mo., from which he will cover Arkansas, Colorado, Kansas, New Mexico, Oklahoma and Wyoming. He joined the company in 1951.

C. J. Gaspar has been appointed eastern regional sales manager, American Air Filter Co., Louisville, in addition to his duties as manager of the New York branch office. **Frank A. Stanton** has been appointed supervisory sales engineer for the company's Herman Nelson unit ventilator products in the Middle Atlantic States area, with headquarters in New York. He was formerly

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● RAYMOND H. FILSINGER JR.
. . . sales v. p., Vanadium

● MALCOLM PETRIE
. . . joins Barr Associates

● JAMES R. McCONNELL
. . . abrasive sales mgr.

● LESTER A. SHEA
. . . becomes division mgr.

sales supervisor in Louisville. **Dale D. Briggs** has been transferred to Louisville from San Francisco, as supervisor of unit ventilator products for the Central States.

● **Raymond H. Filsinger Jr.** has been elected vice president-sales, Vanadium Corp. of America, New York. With the company since 1939, he became eastern district manager in 1948, and was Pittsburgh district manager from 1952 until last year when he was named assistant vice president. **Gustav Laub,** vice president and director of the company, will administer and co-ordinate activities of the selling and technical divisions dealing with commercial affairs.

William C. Cheek has been appointed midwest region sales manager, Marketing Division, Worthington Corp., Harrison, N. J. A graduate of North Carolina State College, he joined the company in 1920. **John H. Loomis** has succeeded Mr. Cheek as manager of the Chicago district office. Mr. Loomis was graduated from Purdue University and has been with Worthington since 1945. **Hollis H. Wise** succeeds Mr. Loomis as St. Louis district manager. A graduate of Lawrence Institute of Technology, Mr. Wise joined the company's Detroit office in 1938, and since 1953 has been resident salesman working out of Indianapolis.

C. E. Carner Jr. has been appointed a national accounts sales manager, Yale Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia. He will co-ordinate sales of industrial lift trucks to certain multi-plant national concerns from headquarters in the company's midwestern regional sales office, Chicago. For the past 10 years Mr. Carner has operated his own industrial lift truck distributorship in Chicago.

● **Malcolm Petrie,** formerly assistant sales manager, Shell Process Inc., West Springfield, Mass., recently joined W. Thomas Barr Associates, Birmingham, as foundry equipment representative.

● **James R. McConnell** has been named manager of abrasive sales, Pangborn Corp., Hagerstown, Md. Mr. McConnell has been associated with Globe Steel Abrasive Co., Mansfield, O., where he was recently sales manager-treasurer. He is a former director of the Central Ohio Chapter of the AFS, and served as its vice chairman last year.

Dr. Reinhard P. Abendroth and **Dr. Edward L. Harmon** have been appointed to the technical staff, Metals Research Laboratories, Electro Metallurgical Co., Niagara Falls, N. Y., division of Union Carbide Corp., New York. Dr. Abendroth has been assigned to the minerals and chemicals engineering group, and Dr. Harmon to the metals research group.

William A. Schubert, formerly application engineer in the compressor department, Allis-Chalmers Mfg. Co., Milwaukee, has been named engineer in charge of rotary compressor sales. He has been with the company since 1937.

Donald W. Reagan has been named Los Angeles district manager, B. F. Goodrich Industrial Products Co., Akron, O., succeeding **Lee L. Horchitz,** manager there for 28 years, who has been appointed western representative on a management council organized by the company. Mr. Reagan joined B. F. Goodrich in 1941 and in 1944 was transferred to the Industrial Products Co. as Milwaukee district salesman. Since 1953 he has been special field representative in the San Francisco district.

● **Lester A. Shea** has been appointed eastern division manager, Lindberg Industrial Corp., Chicago, with headquarters at the company's office in Fair Lawn, N. J. He joined Lindberg Engineering Co. in 1937. In 1952 he was granted leave of absence as general sales manager to serve as chief of the industrial heating equipment section, Metalworking Equipment Division, NPA, Washington. Mr. Shea has been with Lindberg Industrial Corp. since 1954.

William J. McGraw, since 1951 manager of the New York branch office, Thor Power Tool Co., has been appointed manager of the electric tool sales division, with headquarters in the company's executive offices, Chicago. He succeeds **John B. Dempsey,** who has been named president for marketing of Thor's SpeedWay Mfg. Division, there.

William K. Abbott has been transferred from International Nickel Co.'s Bayonne Laboratory to the company's Development and Research Division, New York, where he will be engaged in Ni-Resist development. For the past year he has worked in the Ferrous Castings Section at Bayonne Laboratory, on Ni-Hard, and Ni-Resist and ductile iron studies.

Joseph B. Gaffney, consulting engineer, Fuller Co., Catasauqua, Pa., retired recently. Before his appointment as consulting engineer in 1952, Mr. Gaffney served as chief engineer for 12 years. He had been associated with Fuller Co. since 1916.

Arthur A. Levison, vice president and sales co-ordinator, Fabricated Products Operations, Blaw-Knox Co., Pittsburgh, retired after 34 years with the company. He will serve as a consultant to the fabricated products group. Mr. Levison started in the equipment department, became its

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Circle 624 on Inquiry Card—Page 51

MEN OF INDUSTRY

● JOHN P. KELLY
. . . division sales mgr.

● JOHN M. MELE
. . . becomes district mgr.

● GEORGE E. DRAKE
. . . Electromet sales v. p.

● T. C. CLAWSON
. . . assistant sales mgr.

sales manager, and in 1952 was appointed general sales manager of the newly organized equipment division. When Fabricated Products Operations was formed last year he became sales co-ordinator.

● **John P. Kelly,** formerly Detroit regional manager, Gould - National Batteries Inc., has been appointed general sales manager of the Industrial Division, with headquarters at the home office in Trenton, N. J. With the company since 1945, he was previously associated with Worthington Corp. and E. I. Du Pont de Nemours & Co.

John J. Wagner recently joined the sales staff of the grinding wheel division, Electro Refractories & Abrasives Corp., Buffalo. He will represent the division in Indiana, with headquarters at Indianapolis.

Robert Pittsley has been promoted from magnesium salesman to magnesium sales supervisor in the Detroit territory, Dow Chemical Co., Midland, Mich. Formerly working out of Bay City, Mich., he will now have headquarters in Detroit. Mr. Pittsley joined Dow in 1939.

Paul Terrien, formerly customer service representative at the Niagara Falls, N. Y., plant, Electrode Division, Great Lakes Carbon Corp., New York, has been transferred to the division's Pittsburgh office as sales representative. He joined the division in 1955.

W. N. Murray has been named Boston branch manager, American Air Filter Co., Louisville, succeeding **Robert E. Reid,** who has been appointed special sales engineer in the Boston office. Mr. Murray will continue as supervisory sales engineer for the company's Herman Nelson unit ventilator products in New England.

● **John M. Mele,** recently abrasive engineer in the New York city area, has been named Philadelphia district manager, Bay State Abrasive Products Co., Westboro, Mass. A graduate of Cornell University, he joined the company in 1951.

● **George E. Drake** was recently appointed vice president-sales, Electro Metallurgical Co., division of Union Carbide Corp., New York. He joined the company in 1930 as a salesman for the Linde Co., and served in various sales management positions throughout the country. In 1954 he was transferred to the Silicones Division, where until recently he was assistant general manager.

James B. Reid has been named sales manager in the New York office territory, Magnesium Division, Dow Chemical Co., Midland, Mich., succeeding **E. H. Killheffer,** who will head the Buffalo sales office. **Robert M. Keil,** since 1955 magnesium salesman in the New England territory, has been named magnesium sales manager in Camden, N. J., a position Mr. Reid has held since 1954.

Richard G. Croft, Nathan R. Owen and **John P. Horgan** have been named directors, Foundry Services Inc., Columbus, O., with Mr. Owen serving as chairman of the board's executive committee. They are associated with J. H. Whitney & Co., New York, which recently acquired an interest in Foundry Services.

Harlan T. Pierpont has been appointed manager of sales and a member of the operating board, Electro-Chemical Division, Norton Co., Worcester, Mass. **Frederick J. Rutland** has been named manager of sales engineering for the division. **George H. Powers** was made manager of distribution, Refractories Division.

● **T. C. Clawson,** until recently Detroit branch manager, Corn Products Sales Co., New York, has been named assistant sales manager of the central division office in Chicago. He joined the company 27 years ago.

Jack S. Warshauer and **Frank W. Glaser** have been named vice presidents, Mercast Corp., affiliate of Atlas Corp., New York. Mr. Warshauer continues as executive vice president-general manager, Mercast Mfg. Corp., La Verne, Calif., and Mr. Glaser as executive vice president-general manager, Alloy Precision Castings Co., Cleveland, Mercast subsidiaries.

Howard G. Monroe, formerly associated with Stoller Chemical Co., Akron, O., recently joined the Baroid Division, National Lead Co., Chicago, as sales engineer.

William T. Hoeck and **Walter R. Tarbert Jr.** have been appointed sales representatives, Industries Group, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Hoeck has been assigned to the Toledo, O., district, and Mr. Tarbert to Detroit.

Carl K. Shank, formerly general superintendent of manufacturing, Dodge Mfg. Corp., Mishawaka, Ind., has been appointed works manager. **Paul Jordan** has been named director of engineering. **Richard Kaiser** has succeeded Mr. Jordan as plant engineer, and **Edwin Rhodes** has been made purchasing agent.

George Kepley has been appointed district manager of the Beckley, W. Va., office, Industrial Division, Jeffrey Mfg. Co., Columbus, O., succeeding **James Burke,** who has resigned. **Edward Stephenson,** formerly in the Cleveland office, has assumed Mr. Kepley's former duties in Pittsburgh.

Soffel's THERMOTOMIC HoTop Gives Full Measure Value

THERMOTOMIC HoTop is the efficient and economical "shorthead" compound for Iron and Steel Castings. It generates heat up to 4000° Fahrenheit. It gives sound shrink-free castings with savings up to 65% of the feeding metal because the height of the feeding riser can be reduced to one-half the diameter or less.

This reduction permits lower copes, less sand handling and ramming with saving of production time and cost.

Ask your nearest PMP Distributor for a demonstration of Soffel's THERMOTOMIC HoTop Liquidizer and samples of Soffel's Fluxes.

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PHONE: Hancock 6-1210

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PHONE: Taylor 2091

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PHONE: Fairfax 3-3262

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PHONE: Drexel 1-0034

LONG ISLAND CITY 6, NEW YORK
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Pacific Graphite Co., Inc.
2522 Malt Ave.
PHONE: Raymond 3-5215

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Milwaukee Chaplet & Supply Corp.
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PHONE: Spring 1-1111

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Smith-Sharpe Company
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PHONE: University 5-0501

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PHONE: Olympic 8-3300

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PHONE: Capitol 7-3683

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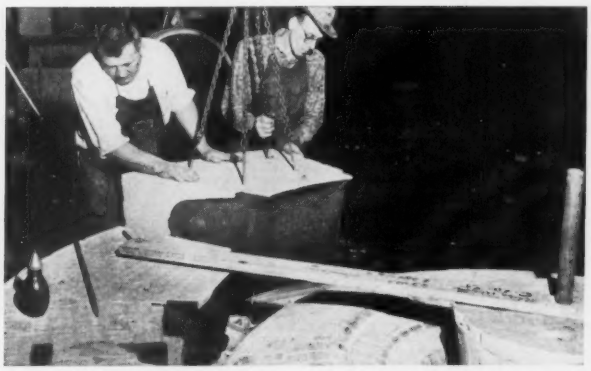
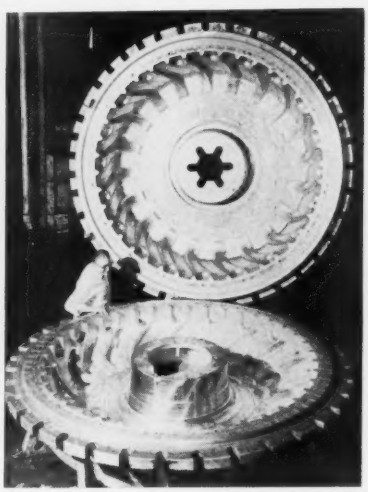
Circle 625 on Inquiry Card—Page 51

Take-down type wooden coreboxes are used to make the CO_2 hardened mold segments for the castings



The mold is made up of 70 numbered segments which are assembled on a level concrete slab for pasting

Each half tire mold back-up section is 106 in. OD, 23½ in. high and weighs 7830 lb. The castings receive solution and stabilizing heat treatments



Tire molds, when ready for use, consist of the back-up sections, tread and bead forming rings. Tires produced are 88.75 in. OD and weigh 2500 lb

Big Aluminum Castings

Form Main Body of Tire Mold

By ROBERT H. HERRMANN
Associate Editor

THE use of cast aluminum back-up sections for molds used to make earth-moving machine tires is a new development. Several advantages are said to be attained, due mainly to the light weight and machinability of aluminum.

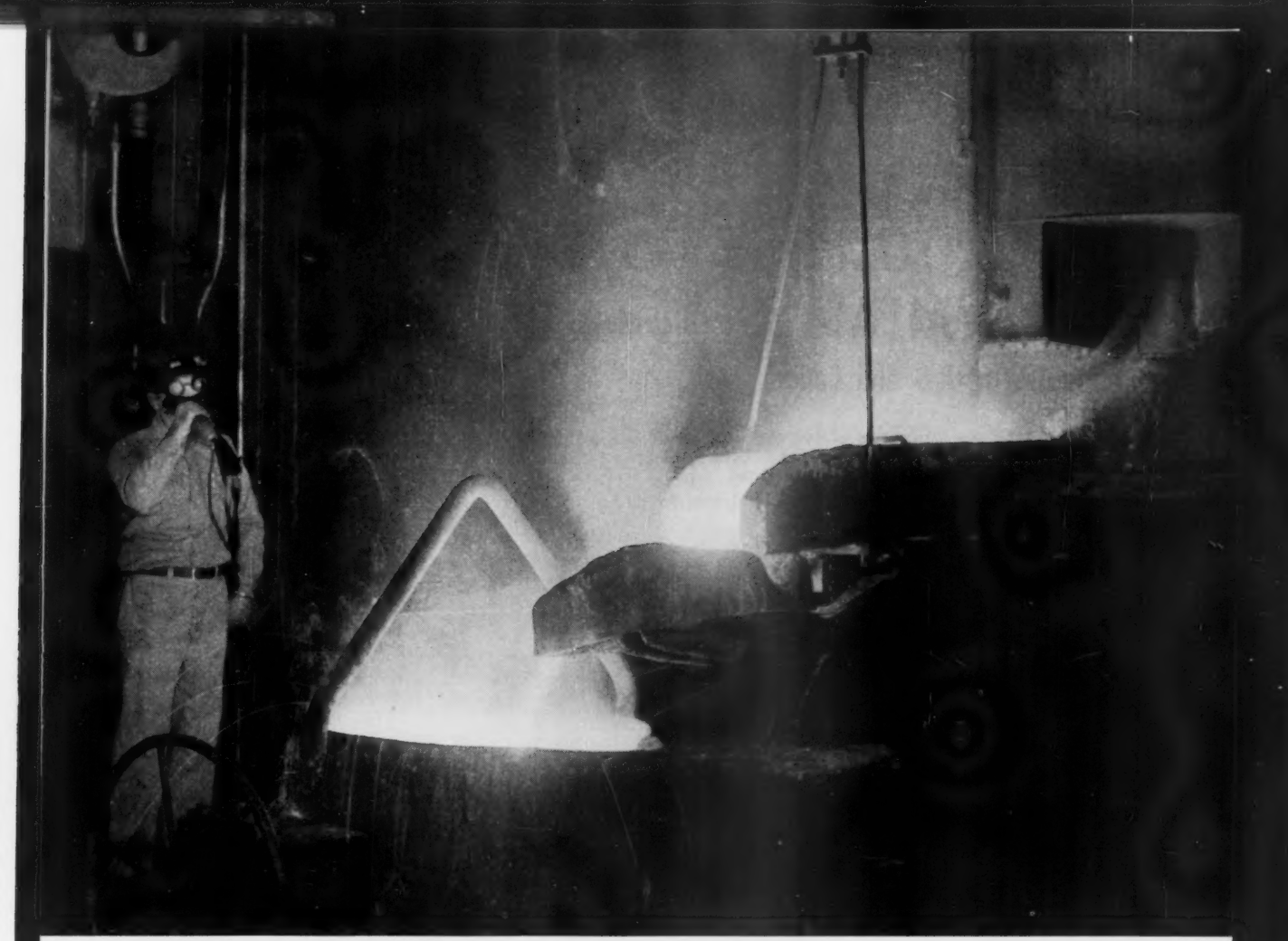
The back-up sections consist of two halves which form the outside of a tire mold. The tread-forming ring and bead-forming ring fit inside to form the complete mold. The back-up halves form the side wall of the tires, give rigidity to the mold assembly, absorbing the pressures and other stresses involved in tire manufacture, and are responsible for maintaining good dimensional accuracy in the finished tire.

Aluminum Co. of America, Cleveland, has made a few of these mold halves for Goodyear Tire & Rubber Co., Akron, O. One set is in production use at Goodyear's plant in Topeka, Kans.

Alcoa casts the sections in molds assembled with 70 CO_2-hardened segments. In each mold 15 segments form the inside of the casting, 31 segments form the outside, 12 form the top and 12 form the bottom.

Segments are made in take-down type wooden coreboxes. First, iron chills are laid in the boxes in those areas which will form metal-contacting surfaces of the mold. Then the boxes are rammed with core sand bonded with sodium silicate. When the sand has been struck off, the boxes are inverted over a perforated plate, and CO_2 is passed through the core. Boxes are disassembled and the hardened cores removed for finishing and coating with a red mud wash.

Cores are numbered and assembled for pasting on a level concrete slab in the foundry floor. As a precaution against the possibility of run-outs, a rough wooden flask is built around the completed mold and the



50 points of Moly = 7000 psi

Moly makes it easy to increase strength of cast iron. Made at the spout, or in the ladle, small Moly additions require no change in the character of the charge, normal melting practice, or the base metal.

More and more foundries find Moly the *practical* way to add strength and toughness to gray cast iron.

For Moly is easy and convenient to use. It allows continuous cupola operation, even when a special job calls for high-strength iron. It's one reason why, in 1956, the use of Moly greatly increased, even though cast iron sales generally declined.

If the use of Moly for high-strength iron isn't already standard practice in your shop, it will pay you to get the full story of how to upgrade iron, without changing normal practice. Write now for our series of bulletins "Why Moly Iron". Climax Molybdenum Co., Dept. 20, 500 Fifth Avenue, New York 36, N. Y.

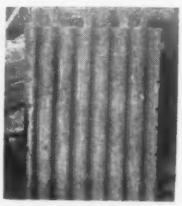
CLIMAX MOLYBDENUM

Circle 626 on Inquiry Card—Page 51

Here's news you've waited for:

WESTERN OLIVINE (highest quality) NOW AVAILABLE for distribution to foundries in U. S. and Canada

The highly refractory properties of our manufactured olivine sand bring about these universally desirable results—*better finish, greatly reduced cleaning costs, superior accuracy, and fewer rejects.* Take cleaning room costs alone: Some major Pacific Northwest foundries are achieving results pictured below:



Roll Shell .....12 hrs. Crusher Bowl ....22 hrs. Crusher Jaw ....10 hrs.

EXPENSIVE CLEANING TIME SAVED:

TWIN SISTER'S OLIVINE has proven a dependable and economic production material in numerous western foundries:

STEEL and IRON
Manganese steel, cast iron, carbon steel where accuracy is important, and problem areas involving grain expansion and metal penetration.

NONFERROUS
In aluminum, brass, and bronze, olivine synthetic molding sand provides improved surface along with high permeability and low moisture.

TWIN SISTERS and CASCADE Brand manufactured aggregates are produced from the highest quality, most highly refractory olivine deposit presently known in the western hemisphere—the western Cascade Mountain area of Washington State. This is a manufactured olivine sand whose processing is carefully and uniformly controlled. Currently being produced in four grades or sizes approximating AFS numbers 45, 70, 130, and the minus 200 mesh CASCADE BRAND Flour.

Packaged in 100 lb. paper bags—available in any quantity.

We invite you to write for complimentary copy of editorial 8-page reprint. "How to Use Olivine Sand for Molds, Cores, Ladle Linings, Washes."

TWIN SISTERS BRAND
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NORTHWEST OLIVINE CO.

715 RIVERSIDE DRIVE, MT. VERNON, WASH.

FOUNDRY AGGREGATE IS OUR PRODUCT . . . NOT A SIDELINE

space between the mold and flask is filled with heap sand. Also, opposite sides of the flask are clamped together.

Two ladles are used simultaneously to fill the mold with 10,000 lb of 355 aluminum alloy at 1350° F. Metal enters the mold from two pouring boxes through semicircular runners to gates which feed the mold cavity through slotted openings.

After the casting is broken from the mold and gating metal removed, it is given a solution heat treatment at 980° F for 11 hr, then quenched, followed by a stabilizing treatment for 5 hr at 440° F. As shipped from the foundry, each half tire mold backup section weighs 7830 lb. The halves are 106 in. OD, 99 in. ID and 23¼ in. high. Casting section thicknesses range from 3½ to 10 in. Castings are sent to Goodyear's plant in Akron for machining before being shipped to Topeka for use in making tires.

Combined weight of the mold backup shell, tread ring and bead ring is about 16,000 lb. The complete mold will produce a tire 88.75 in. in diam. The tire-making procedure involves building a green tire of uncured rubber, latex and ply material. An inner tube is put inside the green tire and the assembly placed in half the mold. The mold is closed with a crane. Four such molds are stacked on top of each other in a large pit heater. A cover is clamped over the pit, and a 48-in.-diam hydraulic ram operating at 1600 psi raises up from the bottom of the pit to hold the mold against the cover.

Steam at 50 psi is injected into the pit around the outside of the molds. Higher pressure steam is injected into the inner tubes. Molds attain a temperature of nearly 300° F. Under these conditions the green tire cures in about 6 hr. Then the steam is released from the pit and from the inner tubes. An overhead crane removes each mold from the pit, sets it on the floor, lifts the top half and removes the tire.

Booklet Details Properties of Several Copper-Base Alloys

J. Stone & Co. (Charlton) Ltd., Woolrich Rd., London, S. E. 7, England, has published a booklet, "Superston for Industry," covering a range of copper-base alloys with characteristics that reportedly can be supplied cast and in the form of plate, sheet, extrusions, rolled bar, drawn wire and tubes in sizes hitherto regarded as impracticable for materials of similar strength. Mechanical and physical properties and chemical compositions of three alloys are charted in detail.

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Famous CORNELL CUPOLA FLUX

No matter what handling methods you use—what mold materials you employ, the quality of your molten iron is all-important! That's why foundries "in-the-know" depend on Famous Cornell Cupola Flux to help purify their metal—to improve the quality of their castings. Famous Cornell Cupola Flux is the one scientifically designed product that greatly increases slag flow off and guarantees complete cleansing of coke (giving carbon constant). Write for a Cornell representative to call. Write for Bulletin 46-B.

"often imitated but never equalled"

The Benefits . . . The Advantages of Famous CORNELL Aluminum and Brass Flux

Makes metal pure and clean.

Permits use of more scrap without danger of dirt, porous places or spongy spots, due to dirty metal.

Thinner, yet stronger sections can be poured. Metal does not cling to the dross as readily.

Crucible or furnace linings are kept clean and preserved.

Cleanses molten brass (whether red or yellow) even when the dirtiest brass turnings are used.

Saves considerable tin and other metals.

Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases to a great extent.

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Members of the International Committee. Dr. A. B. Everest, president, center of front row, is flanked by Vice President Schwietzke, right, and Secretary Lambert, left

INTERNATIONAL FOUNDRY CONGRESS

Attracts 1200 to Stockholm

By VINCENT DELPORT
European Editor

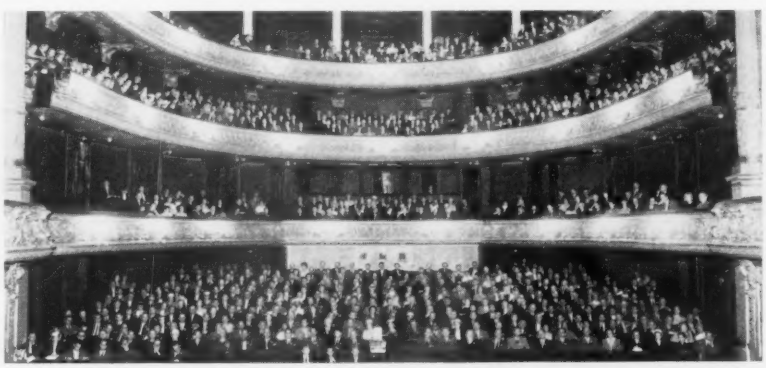
FOR the first time in history, Scandinavia was the site of an International Foundry Congress when the 24th of these meetings was held in Stockholm, Aug. 19-24.

Under the auspices of the International Committee of Foundry Technical Associations, the congress was organized by the foundry technical associations of Denmark, Finland, Norway, and Sweden. Chairman of the honorary committee was B. C. Lagercranz, managing director, Wirsbo Bruks A.B., and chairman of Sveriges Mekanforbund, the Swedish engineering society. He was supported by leading industrialists of Denmark, Finland, and Norway.

Chairman of the general committee responsible for arrangements was N. Lundquist, managing director, Sveriges Mekanforbund, and Lars Villner, its general secretary and secretary of the foundry division, was general secretary of the committee. Organization of this congress was almost faultless and equal to any previous ones.

Industry Well Developed—Scandi-

Official delegates on the stage of the Swedish Royal Opera, Stockholm, at opening session of the International Foundry Congress. Shown below is the audience in attendance at the opening session



View through door of a press forge furnace showing B&W Insulating Firebrick walls and arches and B&W 80 Firebrick floor. The burners and flues are visible on the back wall.

B&W Insulating Firebrick reduce fuel costs 15% and increase production

Experience paid off for this major steel producer. Aware of the benefits of B&W Insulating Firebrick in his drop forge furnaces, he built two new press forge furnaces with lightweight B&W IFB linings. The results were a minimum average fuel saving of 15% *and* increased production, since the entire heating process for certain grades of steel could now be accomplished in one operation. Here's why.

The lightweight and consequent low heat storage of B&W IFB linings keep the furnace walls at a uniform temperature to provide the most efficient heating conditions. Unlike heavier constructions, B&W Insulating Firebrick linings attain a uniform temperature faster with less fuel consumption.

In addition, B&W IFB linings respond quicker to temperature changes, permitting more accurate temperature control. In this instance, this not only prevented the cracking of tool and stainless steels, but helped reduce the total heating cycle, increasing production.

These forging furnaces use a 9" B&W K-30 IFB wall backed up by B&W K-20 IFB. The K-30 is used as face brick because of its high temperature resistance. The K-20 is used as a backing because of its high insulating value. The hearth floor is of B&W 80 Firebrick for abrasion resistance and resistance against attack by millscale at the temperatures involved. Door linings are of B&W Kaocast and B&W Kaolite. R-583

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Circle 629 on Inquiry Card—Page 51

navia as a whole produces just under 1 million tons of castings annually. Many foundries are modern, partly or completely mechanized, and the industry is well developed with technical societies, research organizations and well equipped laboratories.

Sweden, with a population of 7,300,000, has about 480 foundries; they produced 460,000 tons of castings last year, 385,000 tons of it gray iron. The industry has 10,000 to 11,000 workers. Denmark—population 4,500,000—has about 100 iron foundries, 200 nonferrous, and 6 steel foundries which produced 165,000 tons of castings in 1956, including 137,500 tons of iron castings. Employment is about 6200. The 150 foundries of Finland, population of which is 4,300,000, produce some 115,000 tons of castings annually. Norway, with a population of 3,500,000, has about 300 foundries producing 95,000 tons of castings annually—80 per cent of it iron castings—and employing about 5000.

Opening Session—The congress was opened Aug. 19 in the splendid auditorium of the Swedish Royal Opera. It was nearly filled by the delegates, who numbered about 1200 from 27 countries, including about a dozen American visitors. Speeches were interspersed with musical numbers featuring songs by the opera director, Set Svanholm. The session was presided over by B. C. Lagercranz, supported by Dr. A. V. Everest, president of the International Committee and G. Schwietzke, vice president.

In opening the meeting, Mr. Lagercranz welcomed the visitors on behalf of the four Scandinavian foundry societies. He mentioned that the casting industry has old traditions in Scandinavia, dating back to the time of the Vikings, and referred to various Swedish contributions to chemical and metallurgical developments.

Speaking for the International Committee, Dr. Everest thanked Mr. Lagercranz on behalf of the visitors and congratulated the organizing committee for the excellent program arranged. He specially mentioned the early distribution of the two volumes of papers presented at the technical sessions.

The speaker recalled the influence of the northern countries which, through the activities of the Vikings, extended to the Mediterranean shores, western Europe, the Baltic countries, Iceland and Greenland. The shores of North America were reached 500 years before Columbus, and in 1638 the Scandinavians founded New Sweden at Wilmington, Del.

Dr. Everest referred to the importance of Scandinavia to the iron and steel industry, thanks to its fine ores and their resultant products. Because of the lack of coal, water power became highly developed, with electric smelting as a corollary. This was the result of great enterprise and inventiveness. Today many Swedish iron and steel products are a household word, from cookers and ball bearings to ordnance products. These varied products are renowned for their precision and finish. He referred to the number of modern foundries operating in the four Scandinavian countries.

John Sissener, the Norwegian delegate, welcomed the congress on behalf of the Norwegian association, and, in a witty speech, he described some of the characteristics of the Scandinavian people—their spirit, their customs, and their activities. In connection with the congress, he referred to the evolution of the European Community and its expanding economic co-operation.

Opening Lecture—The chairman invited Prof. E. Rudberg of the Swedish Institute for Metal Research to deliver the opening lecture on "Theory and Experience." Starting with the solving of foundry prob-

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How is this performance possible? THE MILLER GOLD STAR SR introduces a . . .
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Tested across the country by practical, critical, hard-bitten working weldors, here's what they say about the new Miller GOLD STAR SR:
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"positively handles ALL electrodes better"
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"easiet arc starting in my experience"
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* "it's just plain the MOST"
Complete particulars on the MILLER GOLD STAR SR, including inert gas and automatic fixture welding, is now available on request.

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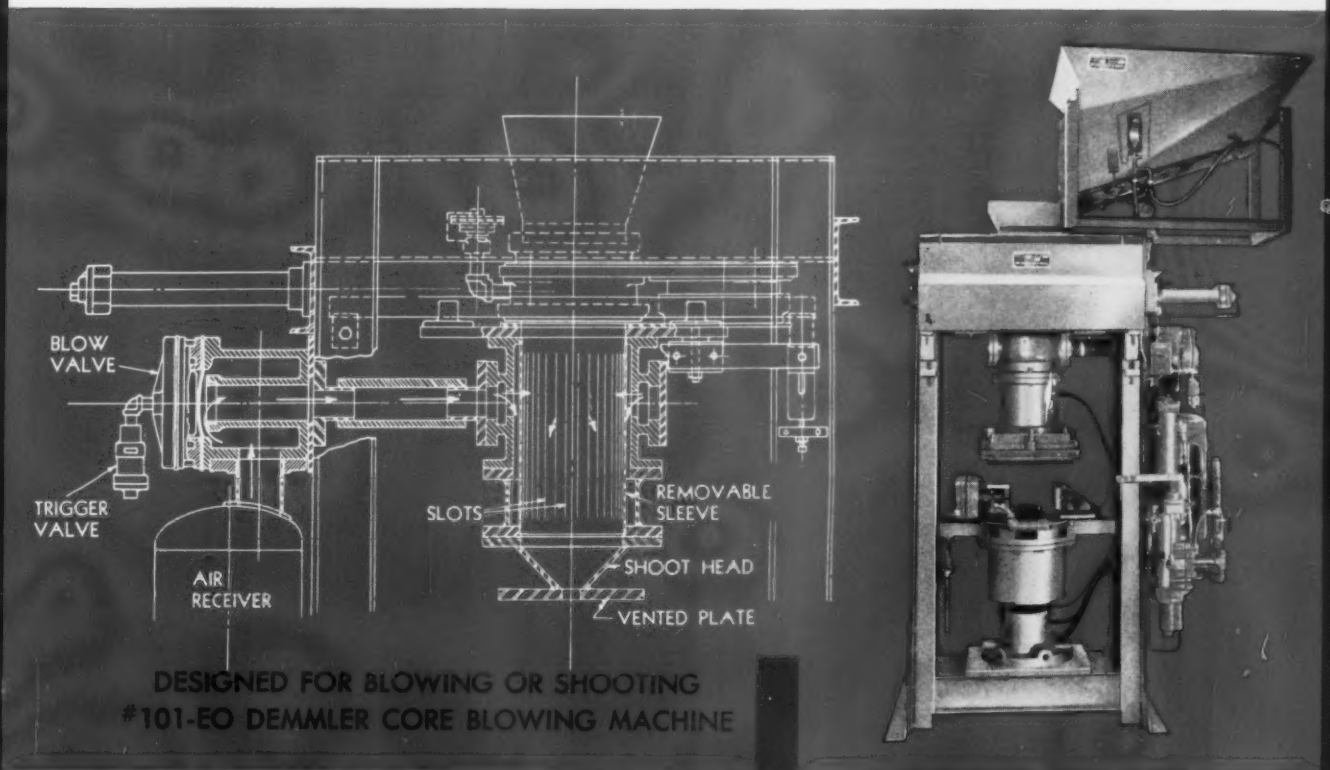

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HL 150 MESH VENTS

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PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

lems and research, his theme was the methods used for such research. Experimental results are of little use if their range of validity is unknown. We must know what they mean and how they are arrived at. Experimental results give an incomplete picture if not assisted by theoretical conceptions.

Examples of the relation between theory and experimentation were given from the study and evolution of the atomic structure of matter, the quantum theory, and solid physical states. When quantitative measurements are introduced, a theory may be taken as correct, and the resulting laws help to further research and discoveries and to correct previous inexact concepts. In a sense, there is a constant stream of interchange between theory and experience which correct each other.

During the congress week, 28 papers were discussed at the technical sessions. Meetings were held of the International Committee and its subcommittees, and a number of works visits and social events were arranged. Technical sessions and committee meetings were greatly facilitated by simultaneous translation in English, French, and German.

At the closing session on Aug. 23, President B. Lagercranz was in the chair, and he invited the president of the International Committee, A. B. Everest, to speak. Dr. Everest, on behalf of all the member associations represented at the congress, expressed deep appreciation of all that had been done by Messrs. Lundquist and Villner of the organizing committee and by all those who had co-operated to make the congress the success which it undoubtedly was.

Detroit Is 1962 Site—He announced that Dr. Ing. habil. J. G. Schwietzke,

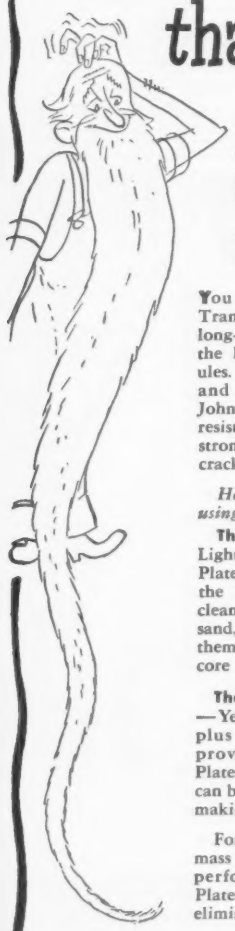
Dr. A. B. Everest, left, presents the Award of Honor to Yngve Granstrom, noted Swedish foundryman

of Verein Deutscher Giessereifachleute, Dusseldorf, had been elected president of the International Committee for 1958, when the congress will take place in Brussels and Liege, Sept. 29 to Oct. 3. He also announced the sites of future congresses as follows: 1959, Madrid and Barcelona, Spain; 1960, Zurich, Switzerland; 1961, Vienna, Austria; 1962, Detroit, U. S. A. An invitation was received from the Czech association to hold the congress in Prague in 1963.

Dr. Everest then announced that the Award of Honor of the International Committee had been awarded to Y. Granstrom, general foundry manager, ASEA, Vasteras, past president of the Swedish Foundry Association and past president of the International Committee (1955), for his contributions to research work and for the considerable services he has rendered to the foundry industry at home, as well as for his services in the international field. Since Mr. Granstrom's health precluded his being present, the presentation of the award had taken place privately.

Another award was the presentation of the new Service Citation of the American Foundrymen's Society to Vincent Delport, European editor

Looking for core plates that LAST LONGER?



. . . then use TRANSITE CORE PLATES that stay on the job year in, year out

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Here are more reasons for using Transite Core Plates:

They speed production—Light-weight Transite Core Plates are easier to handle on the job. They're easier to clean, too . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

They maintain accuracy—Years of foundry service, plus exhaustive tests, have proven that Transite Core Plates do not warp readily . . . can be used for precision core making indefinitely.

For core plates of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 14, New York 16, N.Y.

JOHNS-MANVILLE JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES

Made of Asbestos

DoALL FRICTION SAWING...Unchallenged as the Most Economical Way to Trim Ferrous Castings!

HOW FRICTION IS PUT TO WORK
The friction generated between the work and the fast moving saw band literally *softens* the metal *ahead* of the saw teeth. The teeth hog out this softened metal at cutting rates far in excess of ordinary sawing techniques.

Removes gates and risers up to 50% faster than any other method!

LOW LABOR COSTS! DoALL Zephyr band machine has the fastest cutting rate, enabling the operator to turn out more work in less time than with other types of equipment.

LOW TOOL COST! New type specially designed DoALL Friction Saw Bands have correct metallurgical characteristics to provide exceptional flex life under the high blade speeds required. Exclusive heat treating resists abrasion and "anchors" hardened teeth securely to the band.

LOW FINISHING COSTS! Closer and relatively burr-free cutting minimizes or eliminates secondary machining operations.

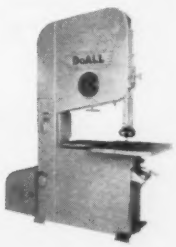
ACCESSIBILITY! Reaches "hard-to-get-at" gates quickly and safely.

Zephyr Band Machine Has Everything For Friction Sawing Performance

Sustained, high production friction sawing is now an everyday operation for DoALL Zephyrs in many foundries. Straight cutting, trimming, removing gates and risers—are just a few of the many jobs being performed many times faster and at lower cost!

No other machine tool can match its blade speeds—infinitely variable up to 15,000 FPM! For super strength and rigidity, the Zephyr has welded box girder construction—similar to that used in modern skyscrapers. The welded steel saw carrier wheels and drive system are dynamically and statically balanced to prevent vibration. Ask for complete information. Call DoALL locally, or write.

NEW! DoALL Friction Saw Bands
Ask about these newly improved friction blades. ½", ¾" and 1" widths, 10 and 14 pitch. Sold in 500' coils in "strip-out" containers, or in custom welded lengths to fit any machine.



DoALL Zephyr Band Machines
Four models of DoALL Zephyr Band Machines tailored to your job. Full 35½" throat, with 20" thickness capacity under saw guides.

FREE DEMONSTRATION
Call your DoALL Store today for a free "in-your-plant" demonstration on your regular production jobs.

Find Your DoALL Store In The 'Yellow Pages'

THE DoALL COMPANY—Des Plaines, Illinois

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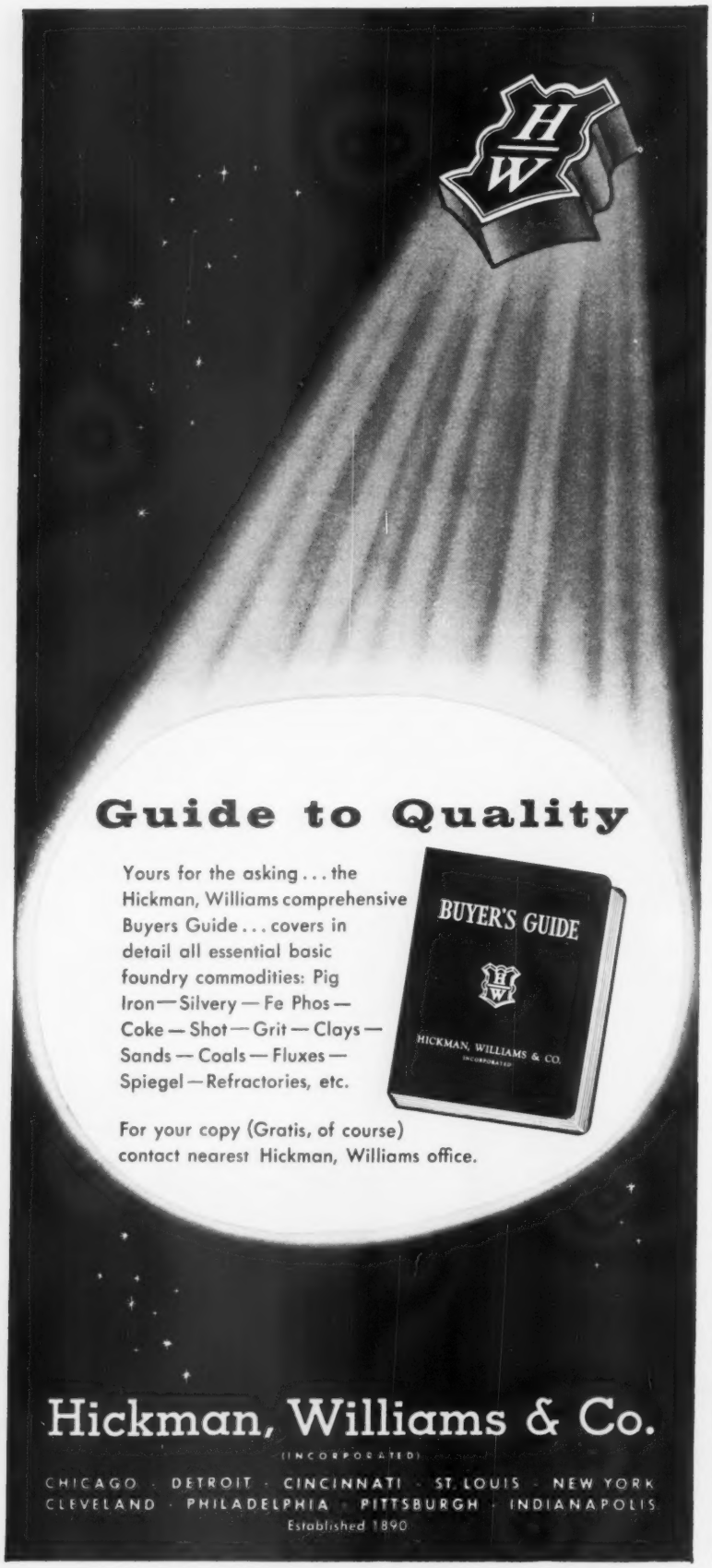
Machines and Blades · Surface Grinders · Power Saws

MACHINE TOOLS ..... CUTTING TOOLS ..... MEASURING INSTRUMENTS ..... SHOP SUPPLIES IN STOCK

Visit our Booth No. 360—Metals Show, Chicago, November 4-8

Circle 736 on Inquiry Card—Page 51


H
W
Guide to Quality
Yours for the asking . . . the Hickman, Williams comprehensive Buyers Guide . . . covers in detail all essential basic foundry commodities: Pig Iron — Silvery — Fe Phos — Coke — Shot — Grit — Clays — Sands — Coals — Fluxes — Spiegel — Refractories, etc.
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Established 1890

of FOUNDRY, director of Penton Publishing Co. Ltd., London, past president of the International Committee (1937) and delegate of the AFS to the congress, "for distinguished service to the Society as its European representative, especially in connection with the International Foundry Congresses." Dr. Everest explained that Mr. Delport had been unable to attend the Cincinnati convention to receive the award and, after reviewing the part he had played in the activities of the International Committee, he invited Harry W. Dietert, AFS president, who was attending as first delegate of the society, to present the award.

E. Alander, obering., Hogfors Bruk, Karkkila, addressed the meeting on behalf of the Finnish association, and G. Schwietzke, vice president of the International Committee, supported President Everest's vote of thanks to the Scandinavian associations. On previous occasions, J. Sissener had spoken on behalf of the Norwegian association at the opening meeting. Prof. Ove Hoff spoke on behalf of the Danish association on the occasion of the banquet, which assembled more than a thousand people at the Town Hall. It was an unusual feature of the congress that the organizers had been able to arrange for the opening meeting to be held at the Opera, the technical sessions in the House of Parliament, and the banquet at the Town Hall, an outstanding architectural feature of Stockholm.

NFA Plans for Its 59th Annual Meeting, Nov. 7-8

A program designed to aid foundry management in labor negotiations has been prepared for the 59th annual meeting of the National Foundry Association. The meeting will be held at the Waldorf-Astoria, New York, Nov. 7-8.

Individual papers and a staged skit will summarize recent developments in foundry labor agreements and forecast the immediate and long-range demands of the major foundry unions.

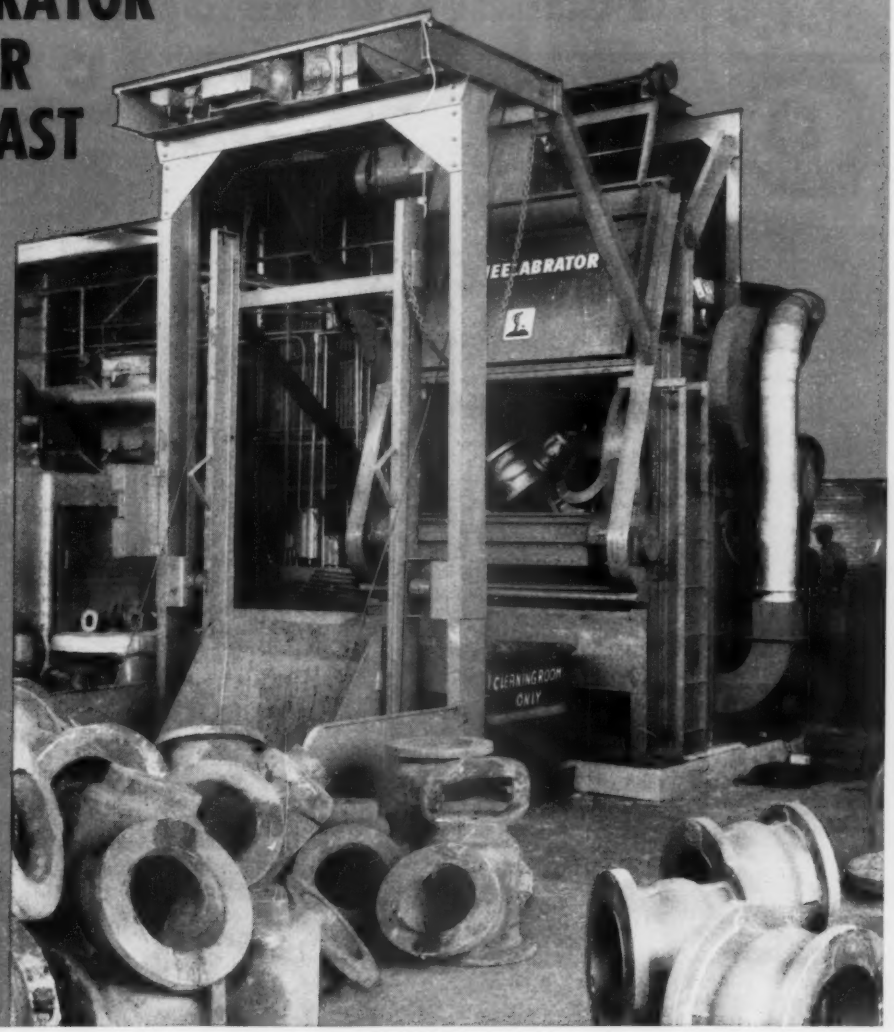
Among the individual speakers on the program are James I. Poole of Fairchild, Foley & Sammond, Milwaukee, who will discuss "Anticipated Demands of Foundry Unions in 1958"; Dr. Paul Mundie of Humber, Mundie & McClary, Milwaukee, whose topic will be "Developing Effective Employee Communications," and Dr. Kenneth McFarland, educational consultant and lecturer for General Motors Corp.

WHEELABRATOR® SUPER TUMBLAST

Saves labor

Saves maintenance

Saves time



Super Savings for Pacific-Southern Foundries, Inc.

Labor requirements slashed three men daily! Cleaning time drastically reduced! Cleaning department geared to production requirements! These are some of the super savings Pacific-Southern Foundries, Inc., Bakersfield, California, obtained with the installation of a 28 cu. ft. Wheelabrator Super Tumblast for cleaning cast steel high-pressure valve bodies and parts.

Cleaning approximately 70 tons of steel castings per day, the Super Tumblast handles the bulk of all cleaning—about 60%—faster, more efficiently and at less cost than by previous methods. Castings cleaned range in weight up to 800 lbs. Typical loads weigh approximately 3000 pounds. In eight months time — 1618 wheel hours — maintenance required has been even lower than expected!

This super-performance is typical of that obtained by all kinds of foundries with the Super Tumblast. Available in three sizes, the Super Tumblast can make similar savings for you. Write today for complete information.

WHEELABRATOR
CORPORATION
505 South Byrkit Street, Mishawaka, Indiana

World's Largest Manufacturer of Airless Blast Cleaning Equipment

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

SCIENTISTS at National Carbon Co. research laboratory working on high-temperature studies have given a new twist to the use of a magnifying glass to set fire to a piece of paper. While the application of the idea is employed in solar furnaces using specially designed parabolic mirrors to focus the sun's energy on the substance to be heated, such furnaces function only when the sun is shining and climatic conditions are favorable.

The new design eliminates this drawback by using the electric arc as the energy source and two elliptical mirrors. One mirror directs the energy at the other which, in turn, concentrates the radiation on the specimen to be heated. Mirrors 18 in. in diam and 6 ft apart with electric arc carbons less than ½-in. in diam drawing 200 amp are said to produce results comparable to a solar furnace with a 60-in.-diam reflector—temperatures above 7000° F. Energy beams may be projected through a transparent window into an enclosed chamber in which the atmosphere and pressure may be controlled.

Only hitch in the process is that materials to be heated must be capable of absorbing the radiant energy. Shiny objects with good reflectance will remain relatively cool while black objects will become extremely hot.

Dry-Film Lubricants

HIGH-PRESSURE and anti-wear properties of some dry-film lubricants are as good as or better than extreme high-pressure oils, according to tests conducted by the Air Force. Most successful types have excellent properties for plain bearing applications at low speeds. Materials studied included commercial baked resin-bonded films and spray can coating with graphite and molybdenum disulphide, experimental baked resin-bonded films with molybdenum disulphide and a variety of resin bases, and air drying coatings applied by dipping.

Life and load-carrying ability of dry-film lubricants are dependent on the resin bonding agent and pretreatment of the metal surface. Maximum life is obtained when both bearing surfaces are coated. Endurance life of films containing molybdenum disulphide exceeded that of graphite films. Entitled PB 121922, "Evaluation of Dry-film Lubricant Coatings," the report may be obtained from Office of Technical Services, U. S. Department of Commerce, Washington 25, for 75 cents.

New Core Binder

APPLICATION of ethyl-hydroxyethyl cellulose as a core binder is discussed in "Water-Soluble Cellulose Ethers as Binders for Foundry Purposes" by Rolf Moren in the August issue of *Gjuteriet* (Stockholm). Suitable dry and green strengths and toughness of core mixes is secured in combinations of 60 to 80 per cent of the cellulose with 20 to 40 per cent melamine resin. About 1 per cent of the combination is added to the sand, and the moisture content is 4 to 5 per cent.

Cores are reported to have good collapsibility and a much lower gas content than the conventional cereal-core-oil type. The cellulose material also is said to be a good additive in cement-bonded sand in combination with some calcium chloride, providing green strength and improving collapsibility. Additions of up to 1.5 per cent of ethyl-hydroxyethyl cellulose to sodium-silicate-bonded cores used in the CO_2 process is claimed to increase collapsibility. The material, with a small addition of sodium metasilicate, is reported to give better results than cereal in core oil sand mixes.

Trace Elements Help

ACCORDING to an investigation on "High Temperature Tensile Properties of Nodular Graphite Cast Irons" by K. B. Palmer in the June issue of the *Journal of Research and Development* (British Cast Iron Research Institute, Birmingham, England), markedly different properties were found for two pearlitic irons in the 450 to 600° C (840 to 1110° F) range.

While there were some differences in basic composition, the microstructures were similar so it was decided to study the effect of various trace elements to ascertain whether or not they might account for the differences in high-temperature properties. Investigation showed that an iron containing 0.1 per cent arsenic or phosphorus maintains a higher strength with increased elongation up to 500° C (930° F). It was indicated that at 400° C (750° F) the tensile strength may be raised from 35 tons per sq in. to 53 tons per sq in. (78,400 to 118,720 psi) and the elongation from 2 to 15 per cent.

Provides Strength

SMALL hard particles a few millionths of an inch in diameter are being dispersed in alloys to form new high-strength materials which will hold up at red heat temperatures. Armour Research Foundation metallurgists state the powder particles function like gravel reinforcement in an asphalt road and strengthen the materials which ordinarily would be like taffy at high temperatures. Dispersion strengthening also could increase resistance to abrasive wear.

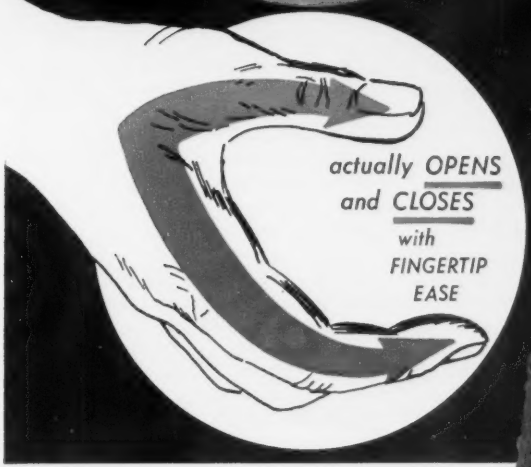
Cleans Up Steel

PRODUCTION of a wrought stainless steel free from stringer type inclusions, banding or segregation of titanium is claimed in a procedure developed by Eastern Stainless Steel Corp., Baltimore, with co-operation of Linde Air Products Co. The steel is Ti-bearing type 321, but the process also has been used with other stainless steels.

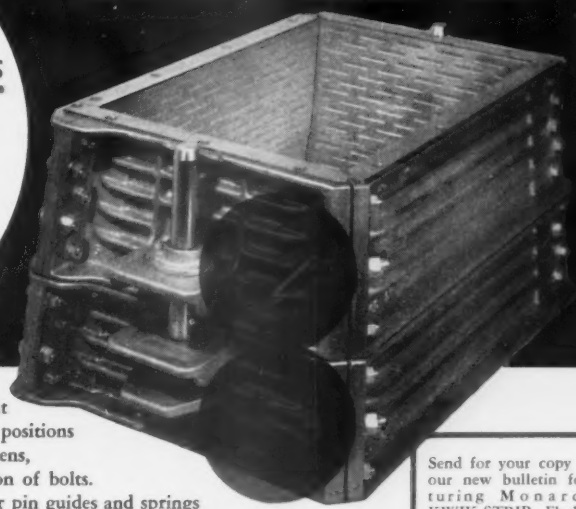
In the process the steel is melted in high-frequency induction furnaces and poured directly into the ingot molds. Prior to receiving the molten steel the ingot molds are filled partially with a measured amount of a special liquid slag at a temperature of 3000° F which is melted in another furnace. Washing action created by the steel flowing through the slag is said to remove any injurious contaminants. The slag forms a protective cover, preventing surface oxidation, and retards rate of solidification of the ingot.

for MORE and BETTER MOLDS...

you can't beat the MONARCH KWIK-STRIP MECHANICAL CORNER FLASK



actually OPENS and CLOSES with FINGERTIP EASE



Locking handle bolts work directly in a straight line. Handles can be placed in any one of four positions (up and down position shown above). Flask opens, closes and locks with positive straight line action of bolts. Binding on working corner is eliminated. Corner pin guides and springs are completely sealed against sand. All working parts are case hardened and cadmium plated. Draw pins are hard chrome plated, centerless ground and polished for true diameter. Forged and plated guide bushings. Cold Rolled wear strips are standard on top of cope and bottom of drag. Wear strips on parting flanges optional. Sides are flat so flask can be set on edge without danger of tipping.

Send for your copy of our new bulletin featuring Monarch KWIK-STRIP Flasks, Jackets, Upsets and Accessories.

CONSTRUCTION: Precision built from cast aluminum or magnesium. Made with the most modern jigs and fixtures and machine tools to insure accuracy.

AVAILABLE COPE and DRAG SIZES: 10″ width x 4″ depth to 30″ width x 7″ depth; 10″ long x 4″ depth to 30″ long x 7″ depth, in increments of one inch. Upsets available in 1″ x 2″ depths. Standard 4° taper. Working sections 4″ and over also available.

"Another Foundry product by"... NEWAYGO engineering company newaygo, michigan

Industry Briefs

MEEHANITE Metal Corp., New Rochelle, N. Y., has appointed three companies as Meehanite foundries. They are Byron Jackson Div., Borg-Warner Corp., Lawrenceburg, Ind., Casting Service Corp., La Porte, Ind., and Empire Foundry Co., Bonham, Tex. Empire is the first Meehanite foundry to be installed in Texas.

Refractories Division, H. K. Porter Co., Pittsburgh, is installing new manufacturing facilities at its Canon City, Colo., plant that will increase capacity more than 50 per cent. The expansion includes equipment to manufacture low-alumina silica roof brick by the wet grinding process, modern materials unloading and storage facilities, automatic conveying equipment and other changes and improvements.

Mallory-Sharon Metals Corp. will be the new name of a corporation to be owned one-third each by P. R. Mallory & Co. Inc., Sharon Steel Corp., and National Distillers & Chemical Corp. Mallory-Sharon Titanium Corp., now jointly owned by P. R. Mallory and Sharon Steel, is acquiring all of the titanium and zirconium production facilities of National Distillers and ownership of Reactive Metals Inc., jointly owned by National and Mallory-Sharon. With this transfer the new corporation will be the largest integrated producer of titanium, zirconium, and other light metals.

Union Iron Works, Spokane, Wash., is expanding its capacity for production of steel castings with an extensive modernization program. New facilities include a 6-ton electric arc furnace, several molding machines, an airless shot blast unit, two core ovens, a car bottom heat treat furnace, and sand mulling and handling equipment.

Whitehead Metal Products Co., New York, will market to the foundry industry the alloy products of Shieldalloy Corp., Newfield, N. J. These alloys include ferroalloys, nonferrous master alloys, and high-purity vacuum melting metals. They will be available through Whitehead's distribution and warehousing facilities in 13 northeastern states. Whitehead also distributes the products of International Nickel Co., Vanadium Corp. of America, Aluminum Co. of America, American Brass Co., and 20 other metal manufacturers.

Michigan Chemical Corp., St. Louis, Mich., has been appointed exclusive national and international distributor of all products manufactured or sold by Petrochemicals Division, Swan-Finch Oil Corp., New York. Michigan Chemical plans to utilize the sales and distribution staff of the Swan-Finch division.

Mercast (Great Britain) Ltd., a company jointly owned by Mercast Corp. of New York and the Guest, Keen and Nettlefolds Group of England, has issued its first license for the production of castings by Mercast's frozen-mercury process of investment molding.

Wisconsin Fork Lift Truck & Crane Co., Milwaukee, has opened a branch at Neenah, Wis., for the sale and service of Allis-Chalmers lift trucks. It will serve the area from Fond du Lac north into the Upper Michigan Peninsula and west to the Minnesota border.

Tri-State Engineering Co., Washington, Pa., is taking over the sale of the material handling equipment it manufactures. Formerly these products, including heavy-duty handling and shipping containers, pallets, racks, etc., were distributed through the Pittsburgh Steel Products Div., Pittsburgh Steel Co.

Cornwall Foundry Co. is establishing a gray iron foundry at Meridian, Miss. The plant is expected to employ about 100 persons. R. Wesley Mellow, president of Liberty Foundry Co., St. Louis, the parent company, is president of Cornwall.

Fly Ash Arrestor Corp., Birmingham, manufacturer of dust collectors, fans, ductwork, and dampers has been elected a member of the Foundry Equipment Manufacturers Association Inc.

Electro Metallurgical Co., Division of Union Carbide Corp., has formed a new division for the manufacture and sale of new alloys, pure metals,

BSCRA OPENS NEW LABORATORIES: June 4 marked the opening day for the new laboratories, experimental foundry and offices of the British Steel Castings Research Association, built and equipped in 12 months at a cost of $260,000 and manned with a staff of 48. With 58 members and 4 associate members, the association represents about 80 per cent of the United Kingdom steel foundry industry. The photo shows the experimental foundry, which occupies an area 40 x 90 ft and has a staff of four persons

Circle 636 on Inquiry Card→

HERE'S WHAT A NEW LOW COST CB10C FLEXIBLO CAN DO FOR YOU

SAVE on initial cost

Not only does the new Patented CB10C cost less than other machines of its capacity, but it handles all types of core boxes, open, horizontally split, or vertically split . . . can replace several single-purpose machines. High capacity side clamp unit is installed in seconds.

SAVE on operating cost

Actually uses less air per cycle. Automatic sequence control and push-button operation means faster operation too.

SAVE on core box cost

The new CB10C handles wood or metal core boxes. Normally the same unvented wooden core boxes used for manual coremaking can be used on the Flexiblo without modification.

SAVE on coremaking labor

One man and a CB10C can surpass the production of several manual coremakers even working with unvented wooden boxes.

SAVE on machine maintenance

This Flexiblo's clean rugged construction and simple all pneumatic circuit means far less maintenance . . . less costly downtime. Single air line is only connection to the machine.

SAVE on box maintenance

The Flexiblo's new air-on-oil, super smooth clamping action is far easier on boxes . . . pounding or blow-by are eliminated. The Flexiblo's exclusive blow action cuts box wear too . . . even when wooden boxes are used.

ONE OF THE NEW FLEXIBLOS guaranteed to blow any core box, wood or metal, that can be blown on any machine, using the same core sand and to blow cores harder, faster and with less wear on core box face or joint and cavity.

PROGRESSIVE FOUNDRIES LOOK TO
BEARDSLEY & PIPER
FOREMOST DEVELOPER OF FOUNDRY MACHINERY

MEMBER FEMA

Write now for full information — BEARDSLEY & PIPER
Division Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois

introducing the new

DIAMOND ALLOY

super alloy tips and liners

FOR SANDSLINGERS • FOR HYDRA-SLINGERS • FOR SPEEDSLINGERS

NEW HIGH IMPACT STRENGTH

NEW QUALITY CONTROL

NEW PRECISION

NEW HIGHER HARDNESS

NEW SUPER ABRASION RESISTANCE

NEW HEAT TREAT

GUARANTEED BY THE MANUFACTURER OF YOUR SLINGER
to provide lowest ramming cost per ton of sand rammed
to provide superior performance under toughest conditions
to appreciably reduce downtime

PROGRESSIVE FOUNDRIES LOOK TO
BEARDSLEY & PIPER
FOREMOST DEVELOPER OF FOUNDRY MACHINERY

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Write now for prices and information
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metal chemicals, and other new products. Established within the Product and Process Development Dept., it will be known as the Fine Metals and Chemicals Div. Heading the new division are C. M. Brown, manager, T. R. Evans, metallurgical engineer in charge of sales, and L. A. Stoyell, metallurgical engineer in charge of manufacturing.

Air Engineering Co., Kalamazoo, Mich., and **Marshall & Wells Co.,** Grand Rapids, Mich., have consolidated under the former's name. Headquarters will be at 521 South Burdick St., Kalamazoo, with branches in Grand Rapids and South Bend, Ind. Air Engineering will represent American Air Filter Co. on filtering and dust control equipment.

Indiana Products Co., 1611-17 South Lafayette Blvd., South Bend, Ind., has been appointed foundry sales representative for the Moto-Bug material handling unit made by Kwik-Mix Co., Port Washington, Wis. The sales territory includes Indiana, Michigan, western Kentucky, and the Chicago area. H. J. Druecker is head of Indiana Products.

Ohio Electric Mfg. Co., Maple Heights, O., has acquired the assets of Homer Mfg. Co., Lima, O., manufacturer of permanent magnetic equipment. Ohio Electric produces electromagnets and electric motors. It also has a plant in North Plainfield, N. J.

Kwik-Mix Co., Port Washington, Wis., a division of Koehring Co., has appointed Dakota Supply Co., 415 North Weber Ave., Sioux Falls, S. D., to be a construction and industrial distributor for the state of South Dakota.

Link-Belt Co., Chicago, has acquired 41 acres of land about 11 miles south of Atlanta as a possible future plant site. No specific plans have been made as yet regarding the use of the site.

Yale Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia, has established a sales and service subbranch at 3057 Madison Ave. S.E., Grand Rapids, Mich., to serve western Michigan.

Atlas Foundry & Machine Co., Tacoma, Wash., has purchased a 33-acre site in Chehalis, Wash., for a pilot plant to cast special alloys.

Air Reduction Sales Co., New York, has begun construction of a multimillion-dollar air separation plant in

Save Scrap Iron, Purify Sand
-magnetically

STEARNS

SUSPENDED SEPARATION MAGNETS

You can remove tramp iron from foundry sand easily and efficiently with a Stearns suspended separation magnet — even from heavily loaded conveyors. Installed in a sand recovery system, the powerful electromagnetic assembly creates a deep, penetrating magnetic field that blankets the entire width and depth of conveyor burden, removes valuable scrap iron and foundry hardware. What's more, you get a clean sand product, ready for re-use.

Stearns rectangular suspended magnet may be installed at the conveyor head pulley, in the position shown, or anywhere along the belt. Collected tramp iron is discharged by moving the magnet aside and momentarily shutting off current. Chain or wire rope suspension may be specified.

Stearns cross-belt suspended separator provides completely automatic tramp iron removal. A cleated belt moving across the face of the standard rectangular magnet (same as above) at right angles to the sand conveyor, carries tramp iron to one side, discharges it into a chute or receptacle.

Stearns magnet specialists, backed by 40 years of research and engineering experience, design and build rectangular or circular suspended magnets, permanent or electromagnetic pulleys in a wide range of standard sizes — or to any specifications to meet your requirements. Get complete details from your Stearns representative — or write for Bulletin 1031G.

54

STEARNS MAGNETIC PRODUCTS

635 South 28th Street • Milwaukee 46, Wisconsin

Circle 637 on Inquiry Card—Page 51

Tabor Presents
TABOR

the "Robat"

simultaneous squeeze-jolt machine for molding copes and drags singly, or in combination

Here is a new production machine by Tabor — to speed up the molding operation. The 520-lb. anvil produces a blow while the squeeze is on. And the "Robat" is completely shockless. Packs the sand faster and more uniformly than gravity packing. Produces top quality castings.

The "Robat" permits stepped-up conveyor line production, even when the flask is deep and the mold is difficult. Handles single flask sizes up to 20 x 30 inches, or a cope and drag combination 15 x 20 inches each. Can be furnished with manual or automatic control. Roll-on, roll-off conveyor available. Other auxiliary flask handling equipment engineered to meet requirements.

Because of Tabor's shockless jolt feature, the "Robat" requires a minimum foundation mounting. Can be placed on a grid over a sand return system. Sets entirely above the floor. It's a rugged machine with steel head and column and steel stripping frames carrying adjustable support pins.

Get full details from the Tabor man serving you. Or write for literature.

TABOR MANUFACTURING CO.
Lansdale, Pa. **Telephone: Ulysses 5-5131**
Division of Turbo Machine Co.

only seconds from placing flask to removal of finished mold

With the new "Robat" Squeeze-Jolt Machine by Tabor, the completely automatic molding cycle consists of:

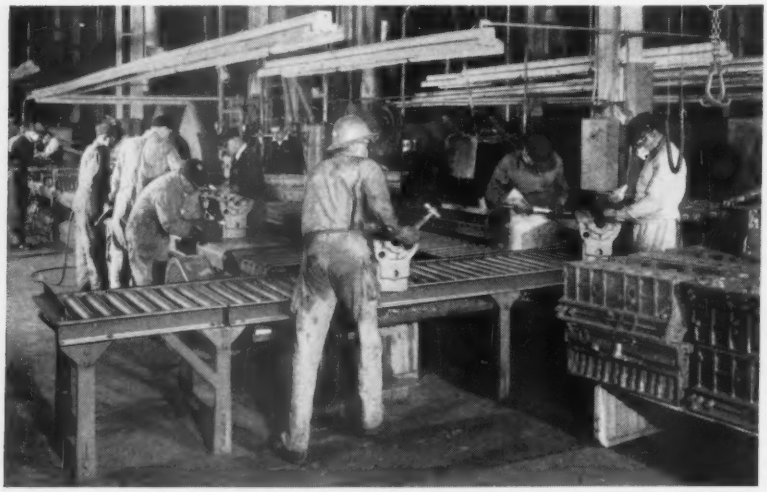
1) A conventional pre-jolt, if desired
2) Swinging the ramming head over the mold
3) Raising the mold against the ramming head and simultaneously squeezing and jolting the mold
4) Raising the flask support pins
5) Vibrating the pattern and lowering the flask on the adjustable support pins in their raised position
6) Swinging the ramming head to the rear while at the same time the pattern is being drawn from the mold by the further lowering of the squeeze piston
7) Push-button safety control permits operator to stop the machine at any point in the molding cycle

TABOR

Circle 638 on Inquiry Card—Page 51

Ask Standard

how to cut costs with conveyors



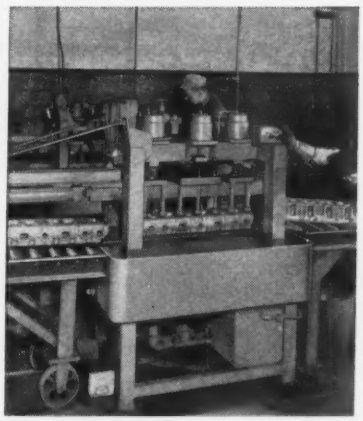
Cylinder blocks are chipped, ground and inspected on Standard Roller Conveyor line.

Eastern foundry simplifies cylinder block handling with roller conveyors

HERE'S another installation in which Standard Roller Conveyors are keeping heavy, bulky components flowing to machining and assembly points with minimum manpower and practically no time loss.

Easy to set up and exceptionally sturdy, Standard Roller Conveyors (live or gravity) can also be job-tailored to your specific materials handling problem — permanent or temporary.

And roller conveyors are only one of the many types of Standard conveyors. Others include belt, slat, chain, pushbar or sectional conveyors as well as spiral chute systems.



Standard Roller Conveyors are available from stock in a wide range of roller diameters, centers and frames.

Call the Standard engineer listed in your classified phone book or write direct for Bulletin 68 — Address Dept. N-10.

Why not take advantage of Standard's half-century of conveyor application experience. Consult STANDARD CONVEYOR COMPANY. General offices: North St. Paul 9, Minnesota. Sales and service in principal cities.

Acton, Mass., near Boston. The plant will cost in excess of $9 million and is designed to produce 75 tons of liquid oxygen, nitrogen and argon per day. It is scheduled for completion in summer, 1958, and is the company's fifth large air liquefaction plant.

Dexter Engineering Co., 1961 Wyandotte Drive, Cleveland, has been formed by Jay P. Johnson, recently sales manager, roof ventilator division, the Swartwout Co., Cleveland. Dexter will act as manufacturer's agent for Swartwout and other companies. Mr. Johnson has been succeeded at Swartwout by Lyle L. Groff, formerly Cleveland branch manager, American Radiator & Standard Sanitary Corp.

Republic Steel Corp. has appointed three representatives to handle sales and distribution of material handling equipment produced by its Pressed Steel Division, Cleveland. They are Fred E. Schroeder, R.P.E., 3 West Plaza, Greenville, S. C., and Arnold Machinery Co., 433 West Second South, Salt Lake City 1, Utah (with branches at Idaho Falls and Boise, Idaho), and Dikcon Co., 3300 Twentieth Ave., P.O. Box 98, Rock Island, Ill.

Electro Metallurgical Co., Division of Union Carbide Corp., New York, has expanded shipping and processing facilities for its ferroalloy briquets and other foundry alloys in the Great Lakes area. Deliveries now are being made from two new shipping points—the company's Ashtabula, O. plant and its recently relocated Chicago warehouse—as well as from its Alloy, W. Va., plant.

Fuller Co., Catasauqua, Pa., leading manufacturer of pneumatic handling equipment, has bought the Dracco Corp., Cleveland. The latter manufactures a full line of dust and fume collection equipment, with the exception of electrostatic precipitators. It will be operated as an independent subsidiary of Fuller, under the same managemeent.

Hatley Foundry Corp. has been formed in Hatley, Wis., with an authorized capital stock of 100 shares of common at par value of $100 per share.

Towmotor Corp., Cleveland, was top winner in the Best Seller Awards made by the National Industrial Advertisers Association recently. An honor award was made to Minnesota Mining & Mfg. Co., St. Paul. The awards recognized outstanding adver-

tising campaigns conducted from November, 1955, through November, 1956.

Leeds & Northrup, Canada, Ltd., 61 Industry St., Toronto 15, has been formed as a wholly owned subsidiary of Leeds & Northrup Co., Philadelphia. It will manufacture and distribute the electronic controls and measuring instruments formerly supplied from the United States. President is J. William Robinson, recently co-ordinator of western operations for Leeds & Northrup.

Standard Electrical Tool Co., Cincinnati, has purchased a 28-acre tract of land there in the 5500 block of River Road, and plans to construct a building to house operations of the company's present three plants and its leased manufacturing facilities. The new plant will cost from $500,000 to $750,000.

Yale & Towne Mfg. Co., Philadelphia, has established in San Leandro, Calif., the first of three major regional industrial lift truck replacement parts depots. It is located in the company's new San Leandro manufacturing plant, and all parts supplied to western U. S. and Canada will now be distributed from there.

Heyward-Robinson Co. has moved its engineering, design and executive offices to the Engineering Bldg., 114 Liberty St., New York, N.Y. The firm's activities include plant and process design and construction.

Black & Decker Mfg. Co., Towson, Md., has opened a factory service and sales branch at 33 Webster St., Hartford, Conn. The company now has 43 such branches in the U. S. and 20 in foreign nations.

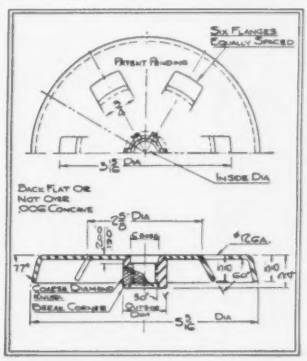
William F. Jobbins Inc., Aurora, Ill., has appointed Alloys & Chemicals Mfg. Co., Cleveland, to be exclusive distributor of its Almag 35 alloy in the Cleveland and Detroit areas.

Booz, Allen & Hamilton, management consultants, have transferred their Cleveland office to larger quarters in the Union Commerce Building, 925 Euclid Ave.

Chicago Eye Shield Co. has moved to new and larger quarters at 2727 West Roscoe St., Chicago 18, Ill. Telephone number is Cornelia 7-9222.

Triangle Core Service has moved to 14455 Waverly Ave., Midlothian, Ill., P.O. Box 567. Telephone number is Fulton 5-4487.

CARROLL'S NEW SAFETY GUARD INSERT gives you Built-In Operator Safety and Top Performance



Now you can have built-in Operator Safety on every portable grinding wheel you produce or use, at very low cost. This radically new Safety Guard Insert with its intergrated revolving guard gives you the all-important safety factor with increased wheel strength and efficiency.

Added economies in production are gained from the ready-made molding form provided by the Guard. Truing of the wheel back is eliminated and true dynamic balance, back flatness and concentricity, show consistently close tolerances within .010 T.I.R.

Safe grinding wheels mean increased production — use and specify wheels with the new Carroll Safety Guard.

FEATURES:

- HIGHEST SAFETY FACTOR • ONE PIECE ASSEMBLY • NO ADJUSTMENT NECESSARY
- PATENTED CARROLL LOCKING DEVICE • INCREASED STRENGTH • LIGHT WEIGHT
- FOOL PROOF MOUNTING • TRUE DYNAMIC BALANCE
- A POSITIVE GUARD ON EVERY CUP WHEEL

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CPM INC.

CARROLL PRESSED METAL, INC.

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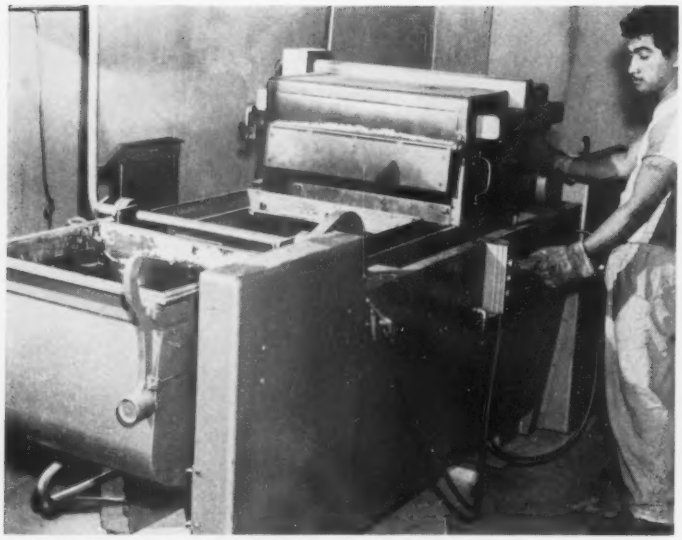
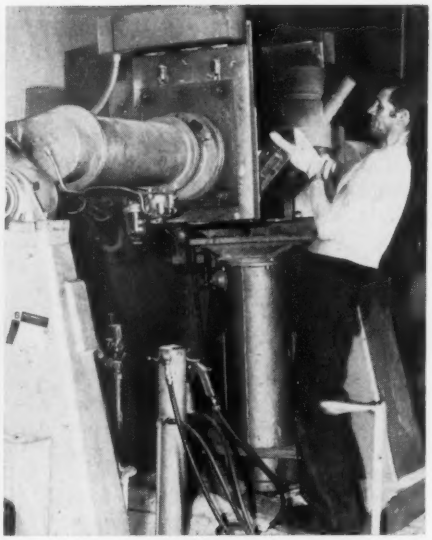


Shell molds are produced on a dump box machine at the rate of fifty an hour. Maximum size of molds is 18 x 24 in.

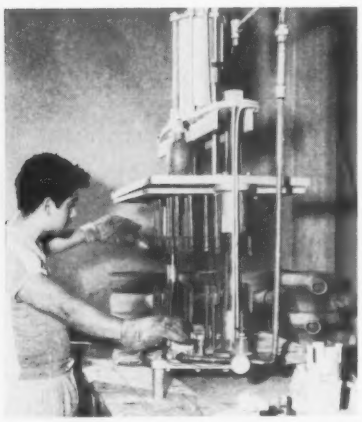


Operator removes large core from box on the company's biggest coreblower

Box is rapped as operator removes core from one of the smaller coreblowers. Most cores are hollow

Shell Molding for Limited Production

By THOMAS A. DICKINSON



Pin machine applies pressure to shell halves to bond them after operator has applied paste

AT GAINES CO., Rivera, Calif., shell molding is competing economically with sand molding techniques where as few as 50 identical nonferrous castings are required. The seven-year-old firm employs 104 workers in a 30,000 sq ft foundry, which its owner, Frank Gaines, acquired in 1956. It specializes in casting aluminum and magnesium alloys for major airframe producers, whose purchases account for about 95 per cent of the company's present annual gross, which is said to be well over $2 million.

Over-all capacity of the company now is sufficient for the production of 20,000 lb of castings, ranging from about 2 oz to 250 lb, during a single 8-hr shift.

Although Gaines is best-known for work in the permanent mold field, the company has utilized both dry and green sand molds and semipermanent molds ever since it was founded. Further, it was among the first western users of the shell molding technique, having acquired its first machine about five years ago.

When he initially contemplated use of the new process, Mr. Gaines was not greatly impressed by success of the automotive industry in using shell molding to meet high-production quality standards. He felt he needed a technique that would enable his company to turn out something a little better than green sand castings without a parallel increase in cost. Investigation showed that shell molding would do the trick, if the tooling used was less costly

how to keep tab on a big spender . . .

Ever stop to figure how many grinding wheels are used in your cleaning room in a six months period? Represents quite a sizable investment, doesn't it?

Today, progressive foundry managers in ever-increasing numbers, are depending on MACKLIN "Wheels of Profit" for their cleaning room operations. *These typical case histories* show why . . .*

OPERATION: Malleable castings. (Floor stand, 20 x 2 x 10″)

	Wheel Life	Stock Ground Over the Wheel
Macklin	24 hrs.	17 tons
Wheel B	18 hrs.	11 tons

OPERATION: Gray iron Castings. Portable, (6/4 x 2 x ⅝″)

	Wheel Life
Macklin	17-20 hrs.
Wheel S	12-15 hrs.

OPERATION: Stainless and high-speed steel billets and ingots. (Swing frame, 20 x 2½ x 6″)

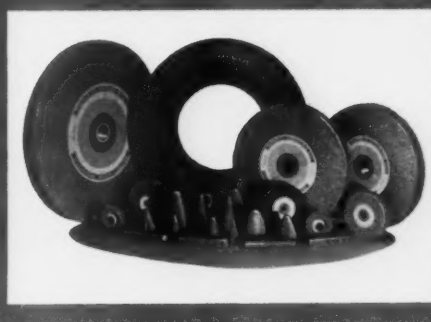
	Wheel Life	Stock Removal
Macklin	13¾ hrs.	330 lbs.
Wheel A	14 hrs.	220 lbs.

OPERATION: 3% Titanium Steel Billets. (Swing frame 16x2x6″)

	Stock Removal
Macklin	36 lbs. per hr.
Wheel C	18 lbs. per hr.

To help you maintain your competitive edge in today's market, arrange for an on-the-job demonstration of MACKLIN wheels in your cleaning room. There's no obligation, just write . . . Dept. 22.

*Name of company on request.



MACKLIN company

JACKSON, MICHIGAN

Macklin of Canada, Ltd., Harrow, Ontario, Canada

Circle 641 on Inquiry Card—Page 51

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It's Quaker's Kaloric — engineered to convey hot materials at temperatures of 350°F. and above.

All Quaker Kaloric belting is made with specially-developed compounds designed to give best resistance to heat. And Kaloric's special cover resists heat that causes ordinary belt covers to harden and crack. Skim coat between plies for insulation and extra flex-life.

Available in any length . . any number of plies in widths up to 72" . . . any cover thickness. Want extra safety, extra belt life? See your Quaker-Quaker Pioneer Rubber distributor today about Kaloric conveyor belting!

For more information write:
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H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

and precise than the iron or steel tooling being employed by the automotive industry.

After experimentation disclosed that this approach would be sound, financially, Gaines started using shell molds and cores to produce parts for companies that had ordered green sand castings. The idea of this, naturally, was to find out whether aircraft manufacturers would appreciate castings which were just a little better at no more cost. They did.

Approximately 2500 sq ft of the company's plant space is devoted to the production and use of shell molds and cores. When new equipment now on order becomes available, the area will be doubled by a substantial reduction in space presently reserved for green sand casting operations.

Shell molding facilities include a pin fuser, three core blowers, and a dump box machine for making molds. Each of the blowers and the dump box machine are capable of producing fifty 18 x 24-in. shells an hour.

Patterns and coreboxes are made of aluminum in the company's own tool and die shop. Powdered resin is used in formulating core and mold sand mixtures. Resin content is 2 to 5 per cent. Generally it does not exceed 3 per cent, but larger amounts are used where molds or cores of increased strength are needed. Sand-resin mixtures are prepared in standard pneumatic and mechanical mixers.

Increase Mold Strength

Cereals and clays are incorporated in shell molding mixtures to increase the dry and green strength of molds and cores, much the same as they are used in ordinary molding sands. Also, a kerosene-dispersed parting agent is added to minimize the phenolic binder's tendency to adhere to the surfaces of coreboxes or patterns.

Coreboxes mounted in the blowers are heated electrically to 450° F. Boxes are closed mechanically and then rotated 180 degrees to bring an attached blowhead above the box. After sand-resin mix is blown into the box, air is exhausted from the blowhead. Boxes remain in the filled position for a predetermined time to allow the desired shell wall thickness to build up through polymerization of the resin from heat of the box.

At the end of this predetermined investment time, the frame of the core blower is returned to its original position and rocked so that unbonded sand-resin mixture in the box

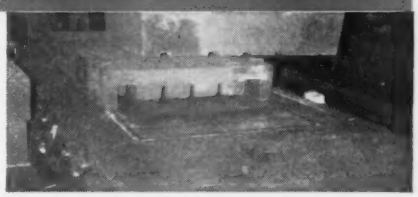
Circle 642 on Inquiry Card—Page 51

KOLD-SET

The Original Kold Setting Binder

1500 lb. core made in 15 minutes—box drawn in 1 hour (can draw box sooner if required).

Core making time reduced 3 hours.



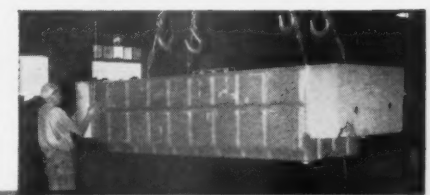
Slab cores located in drag—Six 1500 lb. KOLD-SET cores located in cope make up assembly for 17,000 lb. machine tool floor plate. Casting made entirely in KOLD-SET cores.

Finish cleaning time reduced 80%.

Consistent Quality

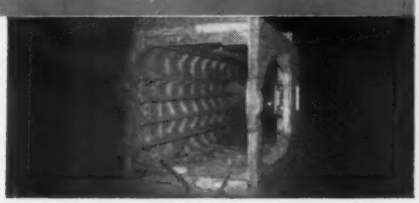
at PRESCOTT COMPANY

Menominee, Michigan



11,000 lb. core made in 30 minutes. Core box drawn one hour after it was started (2 coremakers). Double washed before oven drying 8 hours at 450°.

Core fell free of casting at shakeout.



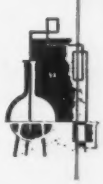
14,000 lb. machine tool column with 2½-6″ metal sections. No rough cleaning required.

Hydro-blast cleaning time reduced 80%.

FIRST in Quality
—High grade raw materials and quality control during manufacture make KOLD-SET stand out first in performance—always uniform and made to the original formulation.

FIRST in Service
—A new method, such as the KOLD-SET process, must be introduced with service. Our engineers are experienced and can instruct in the proper method of application so you will derive the best performance at the greatest savings.

FIRST in Performance
—A quality product plus dependable engineering service have proven most important to consistent results. You can depend on controlled core production and excellent cast finish when KOLD-SET is used.



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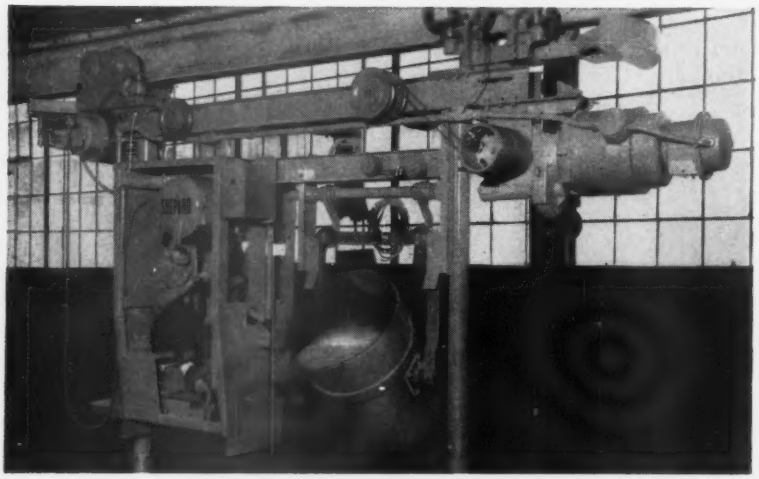
HOT METAL CARRIER

MOVE HOT METAL

the safe, swift, economical way



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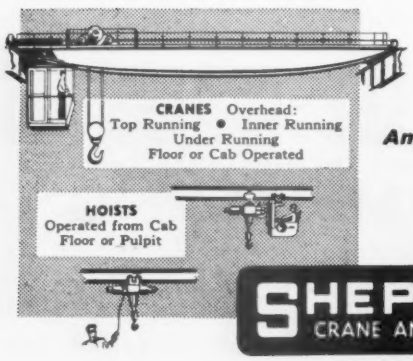

Write for latest Bulletin on Shepard Niles Hot Metal Carriers . . . and, while you're about it, request our representative to call.

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SHEPARD NILES
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will fall back into a storage cylinder. Then the hollow core that remains is cured with additional heat before it is removed from the box.

Ejector pins ordinarily are not used in making shell cores, since boxes for their production can usually be designed to permit removal of cores by hand. However, ejection devices generally are used to remove cured shell molds from patterns.

To eliminate the final possibility of adhesion of sand-resin mixtures to tooling surfaces, pneumatic spray guns are used to apply a release agent to coreboxes and patterns prior to each molding cycle.

As-cast dimensional tolerances ordinarily maintained in shell molding are ±0.015 in. That is slightly better than tolerances obtained in green sand molding. Greater precision is attainable where production efficiency is sacrificed or a higher price per casting can be justified by exacting customer requirements.

In the opinion of Mr. Gaines, shell molding eventually will be used more extensively than green sand molding methods because of the shorter time required for training men to make shell molds and because of the good surface finishes, physical properties, tolerances, and production rates obtainable with the method.

He does not contend that shell molding will eliminate completely the need for green sand molding. For large castings and for one or two-of-a-kind casting jobs, green sand will remain more practical. However, he does believe that shell molding has an overwhelming majority of advantages where any appreciable number of identical castings are needed at a minimum production cost. Also, shell molding will not provide serious competition for investment, die, permanent-mold, or semipermanent-mold casting methods. However, it is certainly a desirable supplement to all of these processes.

Book Review

Work Sampling, by Ralph M. Barnes, cloth, 6 x 9 in., 283 pages, published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y.

This volume explains the fundamentals essential to an understanding of the work sampling technique and offers directions to show how to apply this measurement technique in an individual office or factory. Results of work done in the field (including Tippett's pioneering paper on the subject) are detailed and case histories are provided from men prominent in the field.

It is obvious, of course, that we couldn't ask for, and get, $20 or $30 more per ton of shot and grit unless we could deliver substantial savings to the user every time! It is also obvious that we couldn't offer a guaranteed amount of savings (in writing) and in cash, starting with a premium price, unless we really had something! We have.

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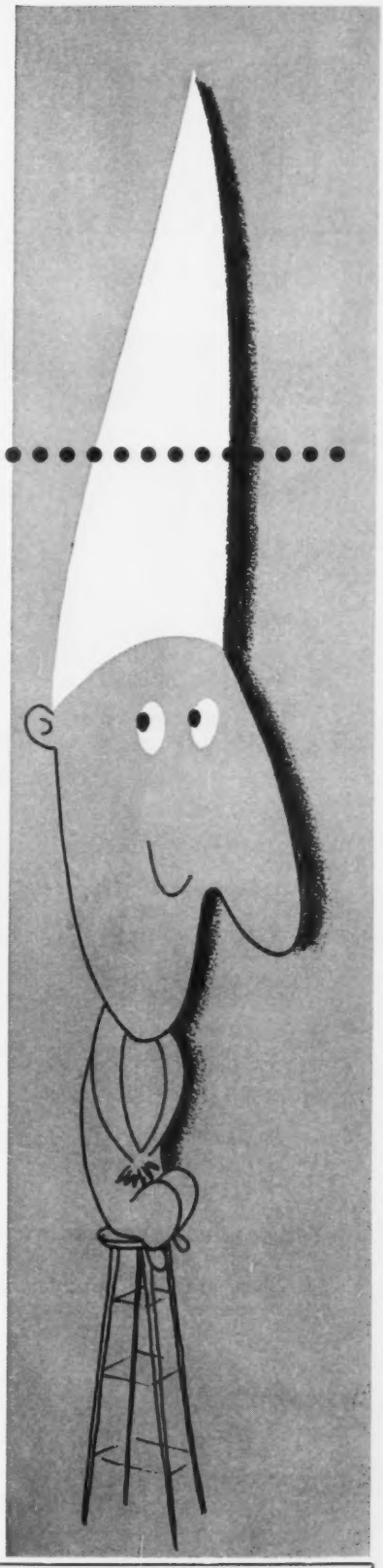
Permabrasive is the only pearlitic malleable shot and grit—made with the proper analysis and a controlled heat treatment. Pearlitic malleable shot and grit is less susceptible to breakdown, has greater resistance to impact and has better cleaning action. It is so much easier on your equipment!

And it doesn't take a complicated routine-upsetting test to prove our point. We'll install a simple ($15) GE time meter on your cleaning equipment and an office boy can keep the records. Would a 10% annual saving on just abrasive costs alone interest you? We'll guarantee *this* much in writing! Further savings on maintenance will astound you. And your time meter keeps records of all this without fuss or feathers. Can you afford NOT to use Permabrasive?



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Permabrasive is available (at no extra cost) in 50 lb. clinch-locked, corrugated cartons, palletized on an expendable pallet, 40 cartons to a package. Here is a triple value: safe to handle, easy to handle and the best shot and grit there is! You have a safe, one-man load; easy to keep track of stock, take inventory; stacks neatly and firmly; unloads in minutes instead of hours. Write for free folder: "It's Triplets"

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Circle 646 on Inquiry Card—Page 51

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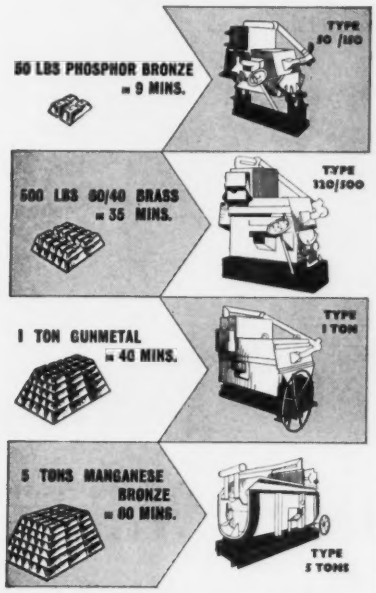

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Circle 647 on Inquiry Card—Page 51

Design Engineers Require Data on Casting Process

They Must Be Informed If Industry Is To Grow

By Colin Carmichael*

THE design engineer is the man who designs the end products in which castings can be used. He must want castings if foundries are to stay in business. He must want them for good reasons—and not because of high-pressure sales techniques or propaganda that tells only half the truth. That means he must be educated in the evaluation of engineering properties and characteristics. He must have a background that will permit him to design or direct the design of castings that will be sound, serviceable and economical.

A design engineer usually is a general practitioner of design rather than a specialist. Specifically, he is not a specialist in casting design. The recent Gray Iron Founders' Society survey reveals that 14 per cent of the engineers questioned have a full-time casting specialist in their engineering department. That leaves 86 per cent without such a specialist. In the course of designing his product, the design engineer has many other areas of decision, such as selecting motors, bearings, gears, hydraulic valves, electrical controls, and fasteners. He may also design parts which are to be cast, forged, stamped, welded or brazed, or parts which might be nonmetallic.

If he is a conscientious engineer he will tackle every new part design with an open mind. Having decided on the general configuration and expected service conditions, he then is duty-bound to investigate the alternative costs and other factors of competitive processes.

If, on insufficient grounds, he decides in favor of a process other than casting, the foundry has lost business which it might have had. But if, on insufficient grounds, he decides in favor of a casting and that turns out not to have been the best answer, the foundry may get a black eye.

A decision made on this basis is logical. Propaganda or prejudice should not influence the decision. Give a design engineer the facts and leave it to his judgment to do the rest. There is the key—give him the facts. In the first place, a found-

*Editor, *Machine Design*, Penton Publishing Co., Cleveland. This article is digested from a talk given by Mr. Carmichael at the Foundry Educational Foundation's College-Industry Conference, March 13-14.

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ONE REFRACTORY does 7 jobs to SIMPLIFY your foundry routine. Add the necessary water to **Ironton BERLITE** and put it to work 7 ways:

RAMMED LINING for bull, mixing ladles.
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PATCHING MATERIAL for all ladles.
WASH COATING for ladles & cupola spouts.

SAVE ON LONGER SERVICE

Slag and metal do not stick to **Ironton BERLITE** . . . so linings are not destroyed in cleaning ladles. **MORE REFRACTORY** than any fire clay brick, **Ironton BERLITE** does not melt or slag out. Since **BERLITE** meets every refractory need, your inventory and delivery worries are over. You'll eliminate refractory repairs, too. **BERLITE** is stored dry; you should never have any waste. Day-to-day service tests prove these facts.

We will send you enough **Ironton BERLITE** to test in your shop under your conditions. We ask only that you pay the freight. If you need help, Ironton engineers are always available to work with your men and show them exactly how to use **BERLITE**. Write or phone us **today.**

SINCE 1917 THE IRONTON FIRE BRICK COMPANY
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OUR 40th YEAR OF Reliable Refractories

Write for name of nearest representative, or telephone Ironton 109

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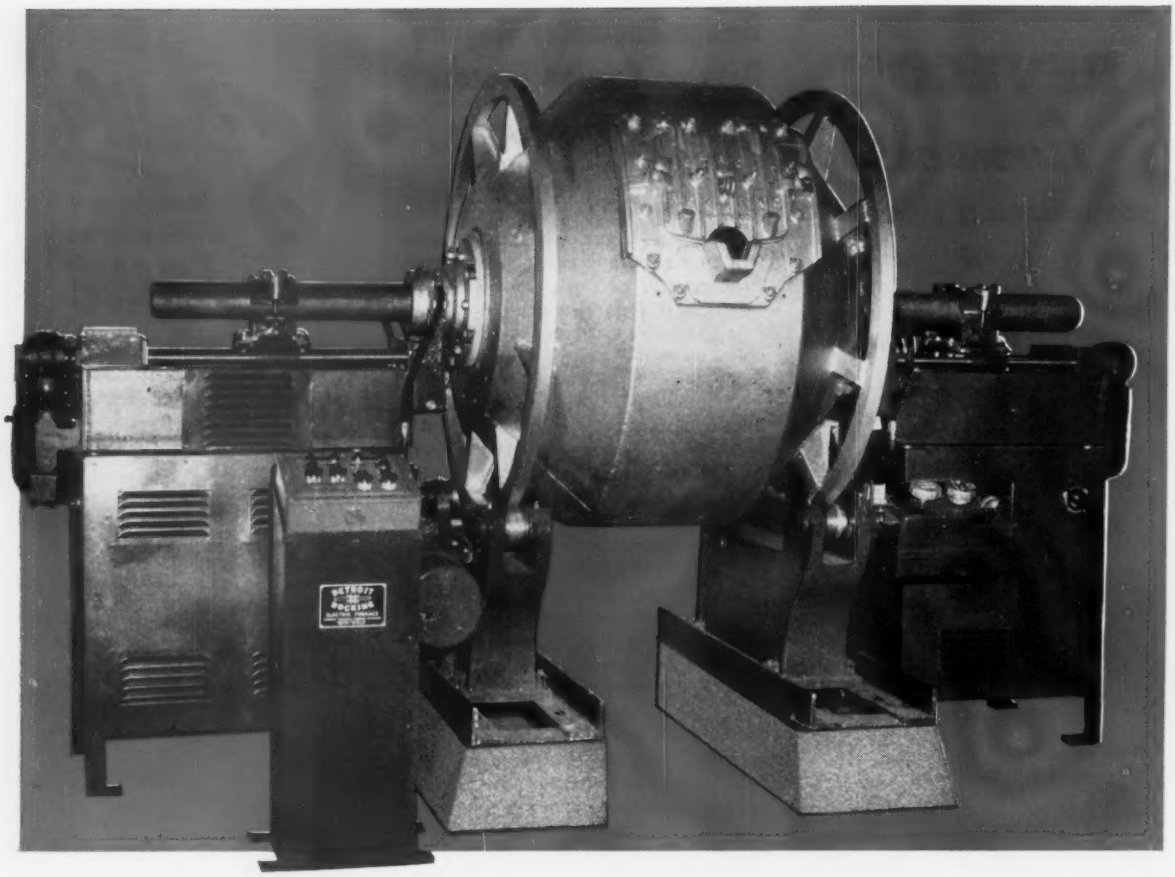

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NEW ARC CONTROL SYSTEM AND MOTORIZED ELECTRODES ASSURE MAXIMUM HEAT UTILIZATION, AUTOMATIC ELECTRODE POSITIONING

The new "P" Series Detroit Rocking Electric Furnaces feature a simplified arc control system combined with motor-driven, pedestal-mounted electrodes.

The indirect arc is automatically controlled by a magnetic amplifier which adjusts motor speed in direct proportion to arc unbalance. This instantaneous action provides maximum heat per power input. There are no moving parts, relays or contactors to break or wear out.

Standard graphite electrodes are independently mounted on pedestals and motor driven. A ½ h.p. D.C. motor drives the automatic control. Direct-connected ⅓ h.p. A.C. motors on each electrode permit manual push-button control at greater speeds than possible by hand. This speeds electrode positioning for charging and shell change.

For full details on the new "P" Series indirect arc Detroit Furnaces, write for Bulletin 5610.

Ratings for furnaces with pedestal-mounted electrodes, motor controlled

Furnace Type	KW Rating	Nominal Cold Charge	Minimum Molten Metal
LFCP	125	350	500
LFNP	150	500	750
LFYP	175	700	1250
AAP	250	1500	3000
AAP	400	1500	3000
CMP	400	4000	8000
CMP	600	4000	8000

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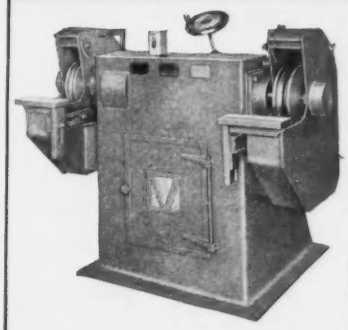
MARSCHKE



The undisputed champion in any grinder division. Precision built to provide maximum wheel life and metal removal. A maintenance man's favorite for long, trouble-free service. Write for Bulletin No. 108.

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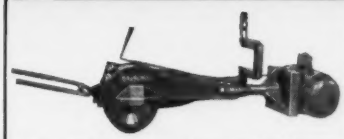

The finest heavy duty swingframe grinder on the market today. Built to withstand plenty of abuse, affords extreme maneuverability, dependable as the Rock of Gibraltar. Write for Bulletin No. 112.

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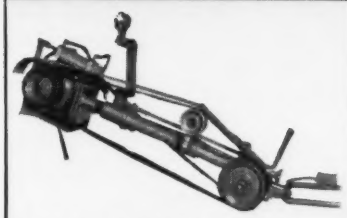

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Circle 650 on Inquiry Card—Page 51

ryman can control the facts to some degree. He can see to it that production methods insure sound castings at competitive cost. In the second place, a foundryman can see that the design engineer is provided with the facts.

The design engineer must be able to evaluate engineering properties and characteristics. The groundwork for such ability is acquired in his undergraduate engineering courses. Here, then, is the first place where the joint foundry-education team can help condition the design engineer.

The purpose of undergraduate teaching is to develop an understanding of engineering principles and how to apply them to problems that arise in engineering practice. To an extent this might be called know-how. More importantly, as President Davis of Stevens Institute of Technology puts it, "Engineers must combine with their know-how a know-why — a broader, deeper knowledge of the laws of science and engineering and how those laws are put to use." To the extent that increasing emphasis on know-why will affect the undergraduate engineering curriculum, it will be in a direction away from instruction in specific techniques or processes.

Would Break with Tradition

President Coover of the American Institute of Electrical Engineers recently told the institute, "The time is upon us when we must break with tradition and eliminate vocational types of courses. These courses now belong to technician training programs."

The trend has been in this direction for some time, and the pressure is on to accelerate it. No longer will the undergraduate curriculum provide the majority of engineers with instruction in specific techniques of foundry work. Time is needed for the broader, deeper work in fundamentals on which the engineer can build the higher level of competence he will need. There is opportunity to play a constructive role in the determination of educational course contents in this new forward look that engineering education is acquiring. It will mean even closer working together and mutual understanding between foundry people and educators.

What courses will be retained in education for know-why? There probably will be a broad course in engineering materials, to include chemistry and metallurgy and the elements of production processes. Here cast materials and the casting process should get a real break. After

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TOUGHEST MORTAR YET

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Circle 651 on Inquiry Card—Page 51

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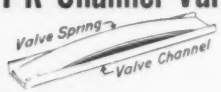

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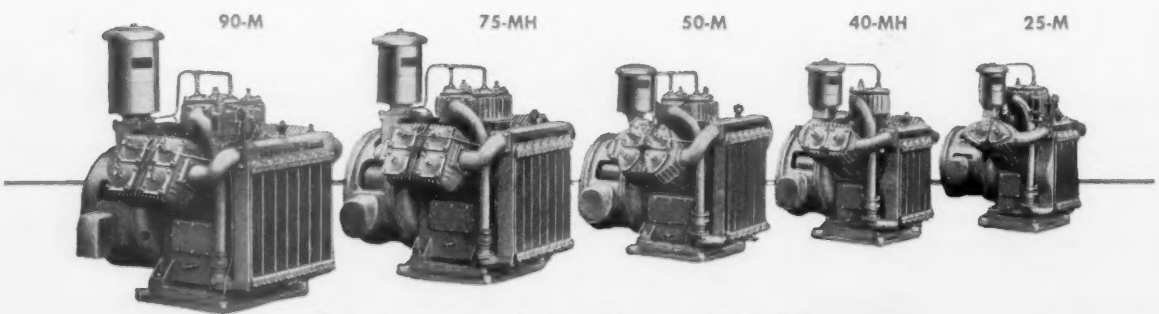
For complete information on all the time-saving, cost-saving features of this 125-hp Motorcompressor, send today for your copy of Bulletin 3188.



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all, every finished metal part except one produced by powder metallurgy must start as a casting. The student will be shown that the liquid state permits convenient adjustment of composition. And to become a useful solid, the liquid must be cast into a mold, however crude.

The instructor who places proper emphasis on this basic process inevitably leaves the embryo engineer with some fundamental notions about casting. In a sense he is conditioned to looking at casting as the primary method of producing metals. Of course the student will go on to learn how the solid metal may be worked into other shapes by forging and by the various rolling and extruding processes for producing standard shapes. He will learn the function of welding and brazing to join smaller parts, castings or standard shapes, to build up a homogeneous structure.

Castings Have Advantages

He also will appreciate that a structure built up of standard preformed shapes is necessarily limited to the compositions that are available in standard shapes. On the other hand, a part produced as a casting has the advantage of tailor-made composition.

Consequently, if the subject of materials and processing is soundly presented, special pleading on behalf of casting as a process is unnecessary. This doesn't mean that oganizations like the Foundry Educational Foundation can sit back and let nature take its course. They can urge instructors of engineering materials courses to present the subject properly in all its aspects. The furnishing of illustrative material such as slides, movies and actual cast parts for classroom use will aid the instructor.

Another course of key importance in the education of a design engineer is mechanics of materials. Here he learns how to figure stress and strain in engineering parts and structures. The studies are of an extremely fundamental nature, built around the concept of elastic action. To drive home the principles, it is necessary to show examples of stressed parts and require the student to analyze stresses and deflections. There is no reason why the parts analyzed should not be castings and so identified.

The wise instructor keeps interest alive by using examples from current engineering practice. He looks for interesting, new examples with up-to-the-minute appeal to bring the breath of life into his course. Obviously, analysis of a part identified as a landing-gear strut on the latest

Low cost 3/4 inch lining of CARO-LINE handles 120 ladles of iron

All-day operation at high temperatures has proved that *IRONTON* CARO-LINE can deliver superior service in any malleable iron or electric steel ladle. One Ohio malleable foundry pouring iron at 2860° F. fills its 250 lb. ladle 120 times before relining. The economy key is in the thickness of the lining—only ¾ of an inch! If you melt

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you ought to know more about CARO-LINE. Ironton makes this highly siliceous refractory for "grief proof" linings in ladles and furnaces. Saves labor, ends scrap loss, furnace repairs, slaggy metal.

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Circle 654 on Inquiry Card—Page 51

supersonic jet fighter will arouse intense interest, whereas a similar analysis of an unidentified bracket will be met with indifference. Foundry people can help by offering good examples of cast parts subject to stress and deflection for such instructional purposes.

Machine design is the basic course where the design engineer really comes to grips with hardware. Previous courses have taught principles and analysis. In machine design the student learns how to apply these principles to the creation of engineered products. There is room for improvement in many of the textbooks now being used for that course. Few machine design instructors are satisfied with available texts. Those instructors who are anxious to give the boys what they need are writing their own supplementary notes and are constantly on the lookout for information and illustrative material. Here is an opportunity for the FEF to establish a close working relationship with instructors of machine design and with authors of machine design textbooks.

The design engineer needs to know what shapes and sections can be molded conveniently, what tolerances are reasonable, what materials are best suited to the casting process, what strengths can be developed in cast metals. And he needs to know how design decisions, such as on tolerances and on strength and soundness specifications, will affect cost. The design engineer needs to know how to compare costs and other factors between alternative processes.

The instructor, therefore, should teach principles. If he has adequate data with which to present the evaluation of casting design, the design engineer will be preconditioned to think first of castings.

The education of an engineer is never finished. Even if the best efforts in working with educators are utilized fully in classroom and laboratory, only a start has been made. Education for casting design must be continued after graduation through technical journals. The momentum of an engineering college education lasts only briefly. The engineer soon finds out that his textbooks and handbooks tell only part of what he needs to know and quickly become out of date. He soon learns that the best way to keep up is to read technical journals.

If the design engineer has acquired in college the background for impartial evaluation, then the technical articles and advertising messages by foundry people in technical publications should find a receptive audience.

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FROM: Plant Manager
MATERIAL REQUIRED: Abrasive Shot
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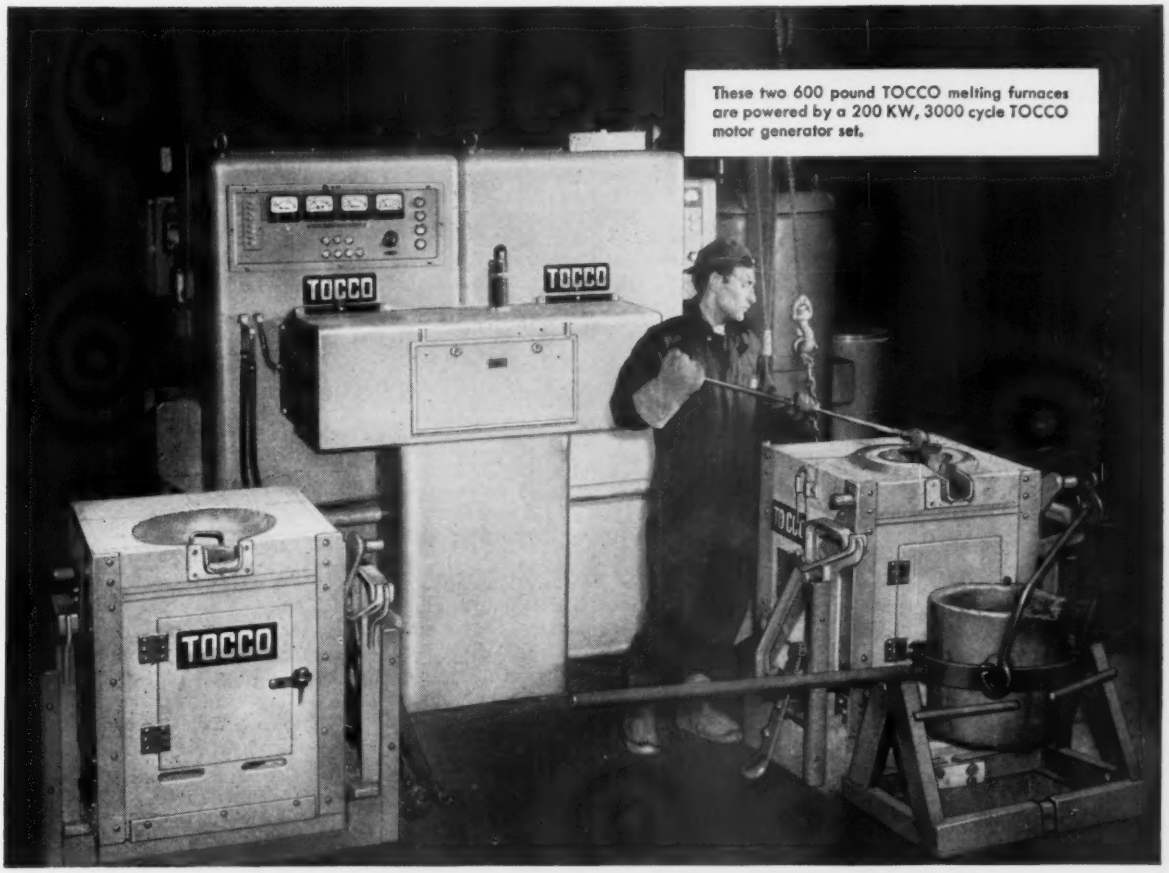
Advantages of Malleable Iron Analyzed in New Brochure

"Value Analysis," the modern trend in purchasing, is applied to malleable iron castings in a new brochure released by Malleable Founders Society. This brochure, entitled "Standard and Pearlitic Malleable Iron Castings Win Approval Under Value Analysis," is designed for use by cost reduction and value analysis committees and purchasing departments. The advantages to be obtained when the malleable foundry engineer is consulted at the drawing board stage are illustrated.

Some of the characteristics of malleable iron castings covered in this brochure are machinability; cold forming; impact resistance; corrosion resistance; versatility of castings; and the wide range of sizes available. Included also are specification tables for standard and pearlitic malleable iron. Copies of the brochure may be obtained from the society or any MFS member.



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In a foundry occupying less than 5000 square feet of space, production of castings jumped between 40% and 50%; tensile strength of alloy castings was boosted from 35,000 to 50,000 p.s.i. Substantial savings in the cost of castings have resulted. Moreover, with precision casting and molding on a push button basis, many former drilling and roughing operations were completely eliminated.

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Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"One whale of a lot can be done within the smallest foundry, using only the tools and facilities we already have, and without killing ourselves"

Within Bounds

THE Lee Hobby Foundry is working at full capacity and against a heavy backlog. It just goes to show that business can pop up in the most unlikely places and through the most unlikely means.

I was having trouble with the rubber vulcanizing process I was trying to use in connection with the development of my sand tensile tester, when a friend referred me to a company within stone's throw of the Lee Hobby Foundry and one I didn't even know existed. The research director of this outfit went clear out of his way to help me, furnished me material and even came over to guide me.

During his visit he examined some of our castings and patterns and was particularly impressed with the thinness of the sections we had managed to pour. The next day he came back with a little pattern, and to pay him back for his help to me—besides grasping the opportunity to show off a bit—I made a casting for him, and for nothing, too (sales promotion budget).

Well sir! That started the ball rolling, and before we knew it we were hip deep in patternmaking and production. ("We" includes Ralph L. Lee, president; Ralph Lee, patternmaker; R. L. Lee, molder; R. Lee, the melter, and Stinkey Lee, the senior shakeout man, besides in an advisory capacity Mrs. Ralph L. Lee, vice president and chairman of the board.)

No Room for Expansion—At first 500 castings was rather a frightening prospect. But the more we got into the project the more interesting it became, for we were hemmed in by limitations in every direction we turned. Our melting capacity was definitely set, the flask size limited by the Lee diaphragm molding machine, the floor would hold only so many molds, the sand heap could be only so big. And besides, we had only so many boards and we certainly were not going out and buy a lot of stuff on the strength of this one oversized order.

All of these considerations had to be taken into account in planning and making our patterns. The one casting was flat bottomed, so a plywood plate with gates, runners and blind riser was rather a simple matter. I don't believe I ever saw a little flask jammed so full. All the cavities filled too, with no cold shuts or shrinks, and they were arranged for convenient cut-off.

The other castings were stinkers calling for a parting that looked like a relief map of the Rocky Mountains. The hard plaster cope and drag match plate we made busted on the first molding machine try, so we salvaged the time we had put into it with a gated aluminum pattern and a hard plaster match. (We're not so sure that this isn't the best bet for sizable but limited future production.)

After considerable cut and try experimentation we made a note in the log book, "Hooray! Cooking with gas." Furnace on, match, flask drag, parting, sand, machine head over, diaphragm clamp, diaphragm squeeze and so on, eight little molds made, carried to the floor and weighted (we have plenty of weights, slightly off color castings). Molds poured, Lee recuperating in an easy chair while they cooled, molds dumped, castings shaken out and degated (abrasive cut-off). Crucible reloaded, furnace on and away we go, late into the night.

The same general procedure served the big molds except there were only four to the heat. Doc Lee's aching back was the determining factor in this change in schedule. Speaking of aching backs, this affliction in the past was responsible for my considering the installation of a little cheap, homemade overhead conveyor. But I'm ashamed to admit that the frequent admonition through printed word and mouth evidently went into one of my ears and out the other. With knee-action the conveyor has been postponed.

A Satisfied Customer — The five hundred castings have been delivered to my satisfied customer. He not only said he was satisfied with the finish, the delivery date and the price, but he proved it by giving me another order for five hundred different castings and a promise of more to come. So there you are.

Now mind you, we still insist on our amateur standing, which permits us to brag a little as to what can be done in blissful ignorance and with a high fence of limitations hemming us in on every side. Inviting you into the home circle of the Lee Hobby Foundry is, of course, the principal object of this article, but as a by-product the thought occurred to me that one whale of a lot can be done within the smallest foundry with only the room, tools and facilities we already have, and without killing ourselves.

It helps naturally, having everything handy, with the things you use the most within easiest reach, back-tracking cut to the quick, not biting off more than you can chew, everything put back after it's used, and a thorough clean-up after each melt or at regular intervals. With no high falutin, slide rule slipping theory or what have you, but with just common ordinary horse sense, little foundries can give a darned good account of themselves, I'll just betcha.

I can't help but think that a lot of economic haze could be cleared out

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Circle 657 on Inquiry Card—Page 51

of the foundry air if more of us could once in a while carry the whole foundry process (alone that is), from the getting of the business, through patternmaking to a satisfied customer and without buying one darned new thing. Growth in square foot floor space is not the only measure of a successful business.

One other thought; I wonder just how much business really is lying around undercover and within stone's throw of the home diggings.

Complete Program for 1957 New England Conference

A varied program of technical material will be presented at the 17th New England Regional Foundry Conference, to be held Oct. 18-19 at the Kresge Auditorium of Massachusetts Institute of Technology, Cambridge, Mass. It will include four ferrous and four nonferrous sessions, each of which will offer two papers; three general sessions; a conference dinner; and the annual foundrymen's smoker Saturday evening at the Parker House Roof in Boston.

Program details follow:

Friday, Oct. 18

9 a.m.—Registration
9:45 a.m.—Welcome: C. Richard Soderberg, dean of engineering, Massachusetts Institute of Technology.
10:15 a.m.—**Future Prospects for New England Foundries,** Prof. Howard F. Taylor, MIT, and Prof. Charles Reynolds, Dartmouth College. Panel sessions headed by representatives of iron, nonferrous and steel foundries.
2 p.m.—Sectional Meetings
Ferrous: **Epoxy Resin,** M. K. Young, U. S. Gypsum Co., Chicago.
Nonferrous: **Design for Quality,** Robert Colton, Federated Metals Division, American Smelting & Refining Co., Newark, N. J.
3:30 p.m.—**Are You Giving Your Customer What He Really Needs?** Richard C. Meloy, Gray Iron Founders' Society, Cleveland.
6:30 p.m.—Dinner: Speaker, Curt Gowdy, Voice of the Boston Red Sox and NBC sportscaster.

Saturday, Oct. 19

8 a.m.—Registration
9 a.m.—Sectional Meetings
Ferrous: **Which Core Process?** Anton Dorfmueller Jr., Foundry Products Division, Archer-Daniels-Midland Co., Cleveland.
Nonferrous: **Oil Bonded Molding Sands,** Robert G. Megaw, Baroid Division, National Lead Co., Chicago.
10:30 a.m.—**Managing a Foundry Professionally,** Glenn C. Cooke, General Electric Co., Schenectady, N. Y.
1:30 p.m.—Sectional Meetings
Ferrous: **How To Use Foundry Manpower Effectively,** Panel discussion: H. M. Palmer, Lewis-Shephard Products Inc., Watertown, Mass., and John F. Bertuccio, J. C. Corrigan Co., Boston.
Nonferrous: **Practical Mechanization for the Small Foundry,** R. T. Koehler, Hamilton Brass & Aluminum Castings Co., Hamilton, O.
3 p.m.—Sectional Meetings
Ferrous: **Metal Injection,** William Lysobey, Air Reduction Co., New York.
Nonferrous: **Treatment of Nonferrous Metals,** R. Ruddle, Foundry Services Inc., Columbus, O.
5:30 p.m.—Annual smoker.

New Diamond Wheel Shape Code Ready for Distribution

Copies of the new American Standard Identification Code for Diamond Wheel Shapes have just been made available for distribution to industry. This standard was approved by the American Standards Association on March 7, 1957.

The foreword of this publication points out that "The growth of the diamond wheel industry has been rapid. It has also become increasingly complex in that a great diversity of shapes are required to perform operations which had not been con-

HOW TO DO IT

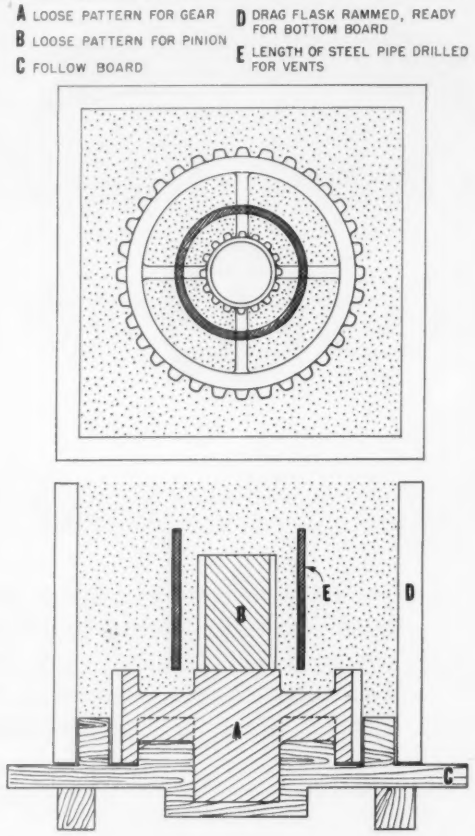
Use of Inner Flask Solves Soft Ramming Problem Around Pinion

By J. OAKLEY
Foundry Foreman
Dobbie Foundry & Machine Co.
Niagara Falls, N. Y.

FILLING a customer's order required the use of two patterns to produce one-piece pinion and gear combinations in various sizes. The gears measured 10 to 16 in. in pitch diameter, and the pinions varied from 4 to 6 in. in pitch diameter. All teeth were cast. The foundry encountered difficulty with swelling of the pinion teeth due to soft ramming of the backing sand. Consequently much work was involved in finishing the teeth to permit them to work in meshing gear.

The problem was solved by using a piece of steel pipe surrounding the pinion pattern to act as a close-fitting flask within the conventional flask. The pipe, drilled with ¼-in. holes for vents, is slightly longer than the face length of the pinion and 2 to 2½ in. larger in diameter.

In making the drag, as illustrated, the gear is rammed first. Then the pinion pattern is set in place with the pipe surrounding it and resting on the rammed sand between the rim and hub. Additional sand then is rammed inside and outside the pipe and well vented with fine wire. The assembly is rolled over, patterns drawn and the cope rammed and set in place. Pinion teeth on the resulting casting now come out to the correct dimensions.

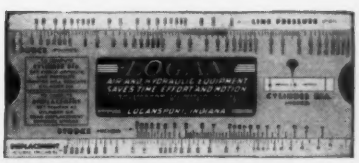


Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

Illustrated—Logansquare Cylinder.
Meets J.I.C. Standards

Look to Logan

the ultimate in air cylinder design



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- ☐ 51 PRESSES
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TO:

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COMPANY _____

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sidered suitable diamond wheel applications only a few years ago.

"As a result the old system of coding the shape types of diamond wheels had become outmoded and unapplicable. Attempts to work within the system already in most common use and to extend that system met with failure. It was impossible to devise a suitable modification of the old system without the fault that one symbol could mean two or more different things under varying conditions.

"To correct this situation, the committee within the industry studied the problem, determined the necessary characteristics for clear description and established a coding system within that framework. By using the system as listed in this new American Standard, every conceivable shape of diamond wheel can now be typed by the use of the symbols set forth therein."

Single copies of the standard are available free of charge by request on company letterhead from the Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio.

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New Iron Foundry

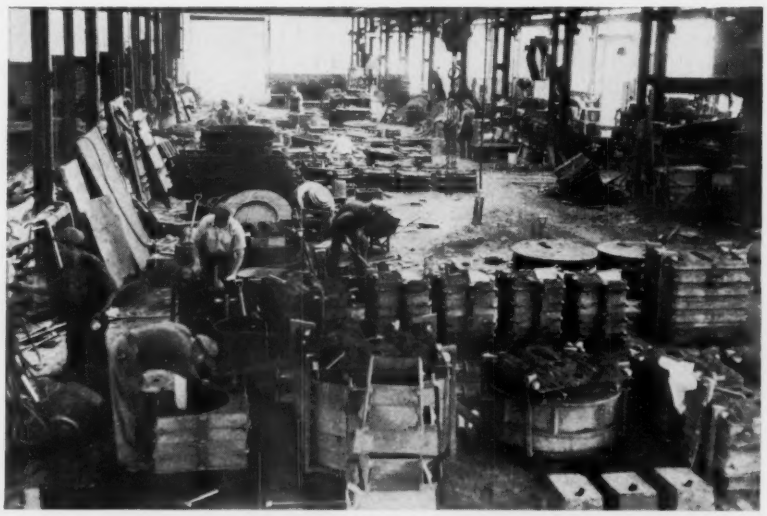
Produces Machine Tool Castings

LATE in July the East Akron Casting Co. moved into its new foundry at 240 Southwest Ave., Tallmadge, O. Established in 1917 in a plant that already was 30 years old, the foundry today employs 63 men and pours a daily average of 15 tons of gray iron and high strength alloy iron.

Engineered to produce machine tool castings weighing from 1 lb to 20 tons, the new building measures 115 x 240 ft, exclusive of the men's washroom and mechanic and compressor shops which are located in an adjoining building. A separate 40 x 75-ft building houses walnut paneled, air conditioned executive offices and a tiled shower. The main foundry building is divided into three bays, the main bay being 40 x 240 ft. Buildings comprising the plant are situated on 15 acres of land.

Included among the new foundry equipment installed are a 78-in.-diam cupola and blower, two 15-ton cranes, a 60 and a 96-in. airless blast table, a coreblower and several jolt squeezers and bumpers, two large mold and core ovens and much incidental small equipment.

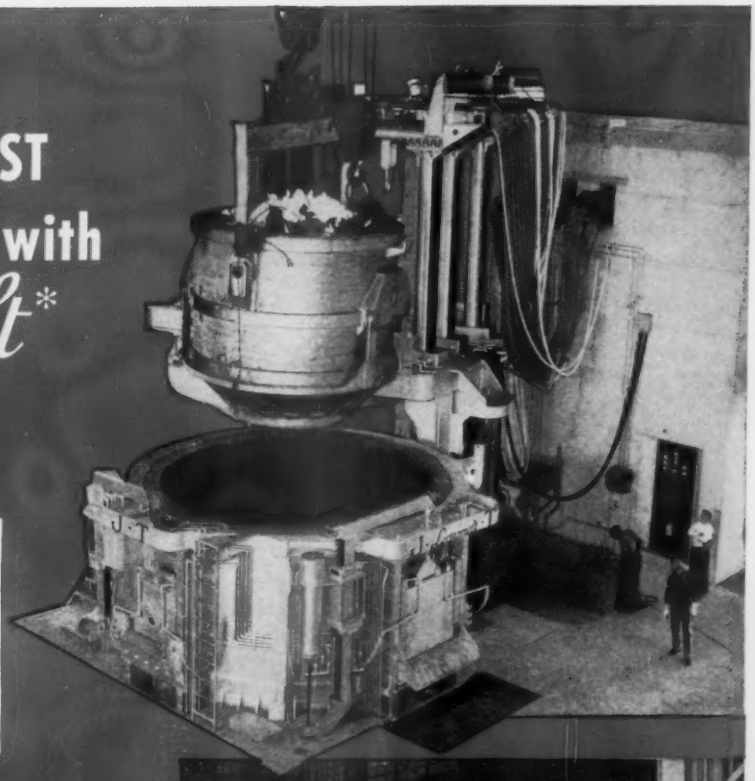
East Akron Casting Co. serves castings customers in the Akron, Warren, Canton and Cleveland areas of Ohio. Russell W. Wenk is president; Raymond H. Wenk, production manager; Kenneth S. Gay, general superintendent; and William Bulgrin, production superintendent.



Heavy molding is performed in a large central bay of the new building

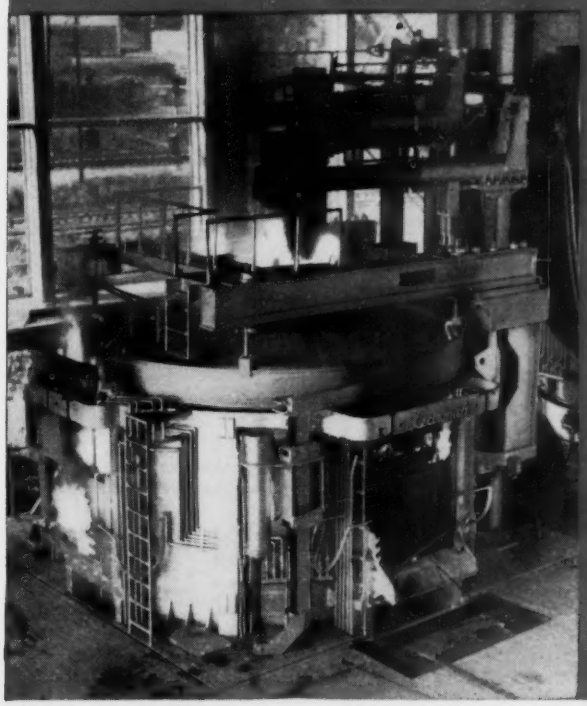
General view of the coremaking department at East Akron Casting Co.

WORK GOES FAST and SMOOTHLY with *Lectromelt** FURNACES



Right: Labor-saving top charging lets a Lectromelt Furnace get to work *fast*.

Below: With a Lectromelt Furnace, you can crowd on the power while holding close control on quality.



Lectromelt's hydraulic tilting mechanism provides positive, easily controlled, trouble-free operation. For Catalog No. 9-B, giving more details, write Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd St., Pittsburgh 30, Pennsylvania.

*REG. T. M. U. S. PAT. OFF.

STANDARD SIZES UP TO

TWO HUNDRED TONS CAPACITY

Lectromelt

SUPER ALLOY CONTROL

in the palm of your hand with...

FANSTEEL REFRACTORY METAL PELLETS

Low cost, readily available, high density, low gas content, easily handled, and . . .

99.8% PURE

Write for current data

K575A

FANSTEEL METALLURGICAL CORPORATION
NORTH CHICAGO, ILLINOIS, U.S.A.

Court Rules Patterns Are Exempt from Sales Tax

Decision Covers Patterns Bought for Casting User

By Albert Woodruff Gray

IN a lawsuit decided a few months ago by the Maryland Court of Appeals, recovery was granted a Baltimore foundry of sales taxes it had paid under protest in the purchase of patterns for customer castings.

Upon receipt of an order for castings, the foundry, if the patterns were not furnished by the customer, was accustomed to purchase them and bill the customer separately for this item, including in the invoice a profit in the transaction. In some instances when the finished castings were delivered to the customer, the patterns were delivered with them; in others the patterns were held by the foundry to fill orders that would be received at a time in the future.

The statute under which this sales tax was imposed provides that, for the privilege of selling personal property at retail, the seller shall collect from the purchaser a tax in the amounts specified. In that law, "retail sale" is defined as "all sales of tangible personal property to any person for any purpose other than those in which the purpose of the purchaser is to resell the property in the form in which the same is or is to be received by him or to use or incorporate the property so transferred as a material or part, or other tangible personal property to be for sale by manufacturing assembling, processing or refining."

In its conclusion that the patterns were not taxable under this statute, the Maryland court referred to the decision of a similar case in Alabama which involved a tax substantially the same as the one in Maryland. In that instance an assessment had been made on the reels and spools used by a wire manufacturer in the sale of its goods.

In its defense to this suit brought against the manufacturer for recovery of a sales tax on the spools, the taxpayer contended that in the wholesaling of its cables and wire sale of these reels and spools was exempt from the imposition of a sales tax as a sale for resale.

On the other hand, the state, in support of the assessment of this tax, maintained that there was a sale of these reels under a plan whereby the manufacturer was as-

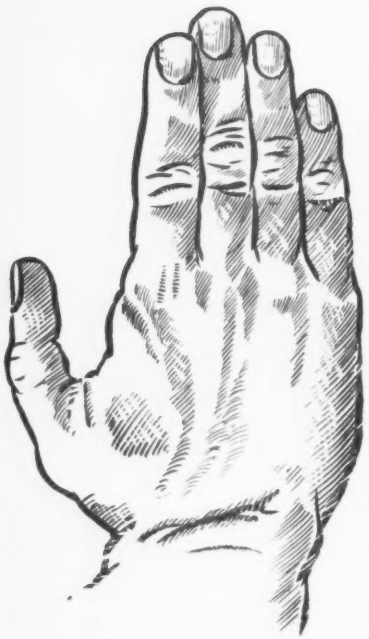
They're both right!

Man on the left claims that Tru-Steel does the best cleaning job at lowest cost. Fellow on the right swears by Malleabrasive. But they're *both* right! Tru-Steel is best on some jobs . . . Malleabrasive is best on others. Different jobs may call for different abrasives but the result should always be the same—the best job at lowest cost per ton of castings cleaned. Whichever you need, Pangborn has the right abrasive for your job. Our sales engineers are experts on abrasives. Ask the one in your area for his advice or write PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Manufacturers of blast cleaning & dust control equipment

IN 50 LB. BAGS
Easy to handle
Easy to stack

Pangborn FOR
MALLEABRASIVE®
AND TRU-STEEL SHOT



to put extra PUSH behind your sales program to the $6½ BILLION foundry market, call on FOUNDRY'S PLUS 5 SERVICE

What is PLUS 5?

PLUS 5 is a 5-step program designed to move more of your products into foundries. It is as simple as that. Every FOUNDRY advertiser is eligible to test its advantages. Here is help in analyzing this market, studying sales territories and potentials, planning the sales effort, and creating a constructive promotion program to the 6½ billion dollar foundry market. You can't afford to overlook this rapidly growing market—and the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative, and he'll show you real sales help!

A Penton Publication

FOUNDRY

more than a magazine . . . a complete sales development service

Penton Building, Cleveland 13, Ohio

sured of the return of the spools and reels.

In its decision, the Alabama court held that the reels were not the subject of a sales tax under this statute. The mere passing of title to the consumer is not the sole criterion of whether it is a sale, said the court, and this transaction was not a purchase by one who wanted the container for his own uses. "The purchaser had no use for it and presumably bought it only because it was necessary in order to acquire its contents."

Cites a Similar Case

Another action of this character in the federal courts involved the cartons used as containers by a manufacturer of soft drinks. Nothing was paid by the bottling company for their return. In ruling on the tax status of these containers, the federal court said, in holding them not to be taxable as the subject of a sale:

"As to the cartons, we agree, however, with the tax court. We do not find the same factual basis for holding that they are purchased for use rather than for resale. There is no arrangement whereby they are drawn back into more or less constant use by the taxpayer. They are delivered with the bottled drinks, no deposit is required for them, no credit or refund is given upon their return.

"Nevertheless we cannot say with complete assurance that they are purchased for resale. The sale price of the drinks is the same whether or not the cartons are delivered. Moreover, use of the labeled cartons as valuable advertising survives the sale to the taxpayers' customers and continues so long as the cartons are in existence."

In its conclusion, and resting its decision on the authority of these two earlier instances of sales taxes, the Maryland court said of the tax collected on the patterns, which were held by it to be nontaxable as a resale transaction:

"Perhaps the closest analogy to the problem in the instant case arises in cases dealing with containers." Then referring to the controversy involving the soft drink containers: "The question arose under a statute similar to ours as to the taxability of bottles, cases and containers used by a bottler in its business of selling soft drinks.

"The court held that the sales of cartons were not taxable but that the bottles and cases were. The court pointed out that the latter were sold at or below cost and at a nominal charge which was refundable on the return of the containers and that this was not a sale in the ordinary

HAVE YOU EVER NOTICED

the many types of headings under which classified ads are listed? There's one for every want—if you want to obtain qualified personnel, want to sell used machinery, want to buy equipment, or want a better position, you should advertise in the classified section of FOUNDRY.

FOUNDRY has 75,000 readers. They represent a readership which covers the entire foundry industry. What does this mean to a classified advertiser? It means that for a nominal sum you get the widest possible coverage of the industry. Your message reaches "just the right people".

classified advertising dept.
Foundry ★
Cleveland 13, O.

No. 8® GRAPHITIZER

TREATS GREY IRON EFFECTIVELY FOR LESS THAN 10¢ PER TON!

Thousands of foundries are already employing No. 8 because it is such an amazingly simple and accurate graphitizer. No. 8 is a powerful inoculant. It plants graphite *throughout* the molten metal. No. 8 gives castings a higher machinability rating. It reduces chill and hardness in thin sections and improves wear and shock resistance. No. 8 makes castings more metallurgically uniform and, most important of all, No. 8 graphitizer *substantially reduces the cost of metal control* (cost figures in several foundries are below 10¢ per ton of metal treated). No. 8 is easy to apply by funnel or envelope method. As the photomicrographs shown here indicate, No. 8 is effective for special metallurgical control. From every standpoint it will pay you to use No. 8, regularly. For further details write for Engineering Bulletin No. 2.

Base Iron

Photomicrograph from broken half of 1.25 arbitration bar of gray iron not treated with No. 8 Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties: Transverse Strength 2,497 lbs. (wedge bar) • Brinell Hardness 229 (wedge bar) • Total Chill Depth 41/32 in., Clear Chill 26/32 in. • Deflection 0.23 in.

Note how the iron treated with No. 8 has increased in deflection. Usually iron treated with No. 8 will show an increase from 10% to 30% in deflection over the base iron value—this means less cracked castings and more serviceable metal.

Treated Iron

Photomicrograph from broken half of arbitration bar of same base iron treated with 1 lb. per ton of No. 8. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties: Transverse Strength 2,970 lbs. (wedge bar) • Brinell Hardness 217 (wedge bar) • Total Chill Depth 13/32 in., Clear Chill 10/32 in. • Deflection 0.31 in.

GF240-1

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

Malleabrasive reduces overall cleaning costs as much as 50% because—

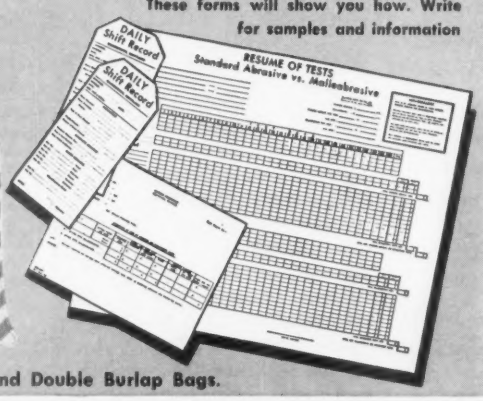
- It wears 2 to 4 times longer than ordinary shot and grit.
- It increases output of cleaned castings.
- It reduces wear on machine parts and cuts machine down time.

These are not just claims. You can prove these savings right in your own plant, in your own machines. We supply all the necessary forms and instructions.

Malleabrasive has reduced costs in more than 800 plants. Why not yours?

make your own 30 day test...

These forms will show you how. Write for samples and information



In easy to handle 50-pound Double Burlap Bags.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO ®

sense but a device to obtain a return of the containers for further use, although in the form of a resale and repurchase."

Then referring to the use and resale of the patterns in relation to the claim of the foundry for a refund of the tax, it was said in conclusion:

"In the instant case there is no doubt that the resales were profitable and were in all cases contracted for prior to the beginning of production. The purpose to resell was manifest and a resale price quoted in every instance contemporaneous with the placing of the order for the patterns.

"Considering the statute in a light most favorable to the taxpayer and in the light of its manifest purpose to limit the tax to retail sales and relieve the wholesalers and manufacturers, we think the foundry has made out a case for exclusion from the tax sought to be imposed."

References

Baltimore Foundry & Machine Corp. v. State. 127 Atl. 2d 368, Maryland, Dec. 6, 1956.
Maryland Code, 1951, Art. 81, sec. 320.
State v. Reynolds Metals Corp., 83 So. 2d 709. Alabama, Nov. 28, 1955.
District of Columbia v. Seven-Up Washington. 214 Fed. 2d 197, District of Columbia, Jan. 14, 1954.

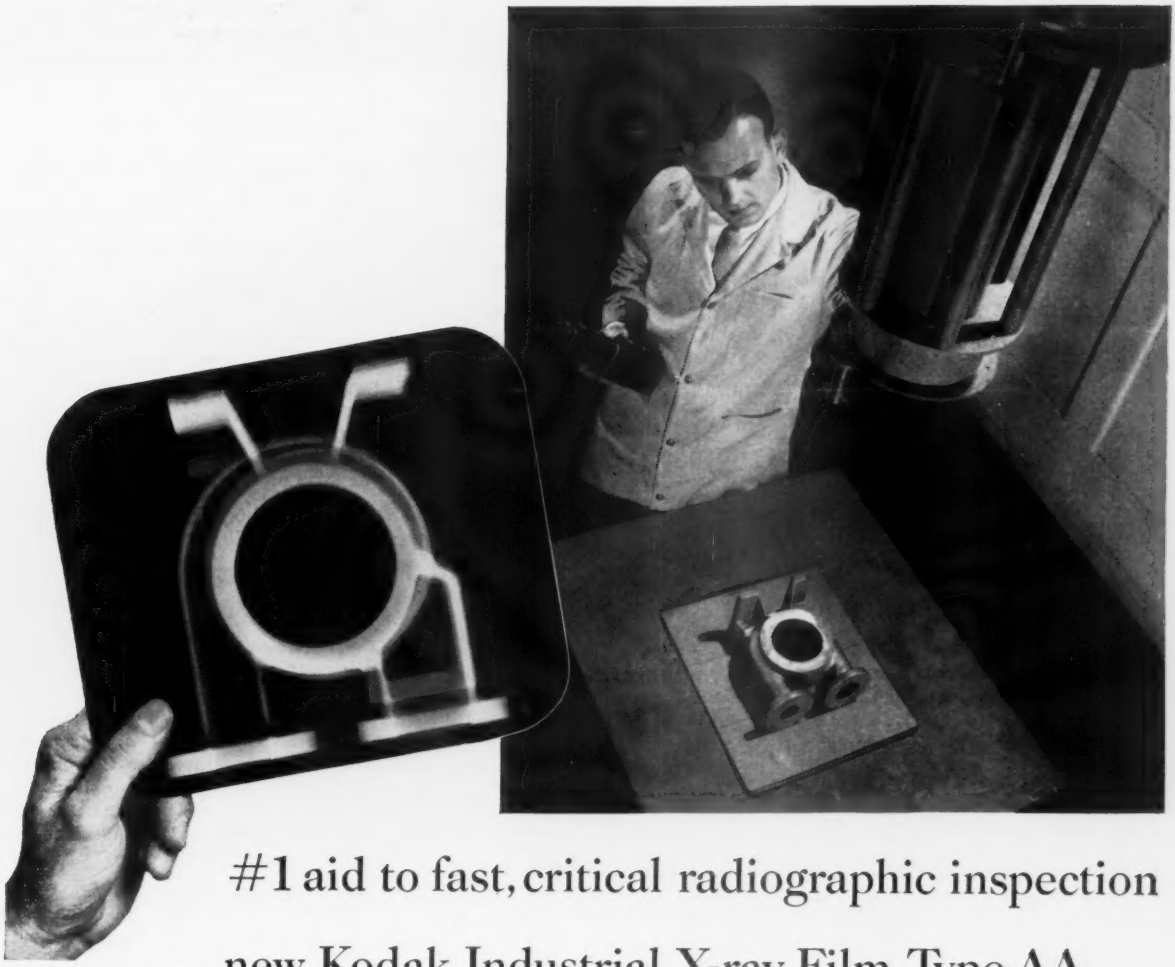
Book Review

Creep and Recovery, by 22 authorities, 6 x 9 in., 372 pages, published by American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Price $6.

A bound volume of papers presented at a meeting on "Creep and Recovery" in 1956, this work is assembled for metallurgists, engineers, designers, solid state physicists, and chemists who must deal precisely with metals.

Creep, a change in dimension under constant stress, and recovery, the restoration of prior conditions, are factors to consider when tolerances are close and clearances are precise. Graphs, tables, charts, and photomicrographs are used to supplement 14 different areas of the subject matter.

". . . then add 50 lbs of copper . . . two tablespoons of bismuth . . . and a pinch of silicon!"



#1 aid to fast, critical radiographic inspection

...new Kodak Industrial X-ray Film, Type AA

TODAY'S radiographic inspections call for increased sensitivity, greater speed. And these are the characteristics of Kodak's newest industrial x-ray film, Kodak Industrial X-ray Film, Type AA.

This film retains all the excellent qualities that made Kodak Type A the most widely used x-ray film in industry. Then, in addition, it provides greatly increased speed.

This permits exposure time to be cut as much as 50%. It allows adjustment of the radiographic factors to obtain greater contrast and easier readability.

Kodak X-ray Film, Type AA can multiply your minutes—can extend the usefulness of your present radiographic equipment.

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Read what the new Kodak Industrial X-ray Film, Type AA, does for you:

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under the usual shop conditions of use.

Kodak

Kodak Industrial X-ray Film, Type AA and Type M is now available in 100-sheet boxes wrapped without interleaving paper. Designated as AA-100; M-100.

Obituary

HAROLD H. JOHNSON, 56, director of research, National Malleable & Steel Castings Co., Cleveland, died Aug. 22. He was graduated from

HAROLD H. JOHNSON

Rose Polytechnic Institute and later received a master's degree in chemical engineering there. Mr. Johnson joined National Malleable's Cleveland plant in 1923 as a research engineer, and after several years as a melting foreman was appointed chief metallurgist of the Sharon, Pa., plant in 1939. Two years ago he returned to Cleveland as director of research. Active in technical society work, he served on executive committees of the Steel Division and Educational Division of the American Foundrymen's Society. In 1952 he was honored by Steel Founders' Society of America as winner of the Steel Foundry Facts Award.

Harry F. Greek, 48, president, Hill & Griffith Co., Cincinnati, died Aug. 28. He was associated with the company for 22 years, starting as a salesman. Mr. Greek was a former secretary and director of the Cincinnati Chapter of the American Foundrymen's Society.

John A. Moore, 79, retired foundryman, died Aug. 21, in Alma, Mich. A native of Ottumwa, Iowa, his experience covered work with foundries in the South, the middle and far West. His affiliations included Jackson & Church Co., Saginaw, Mich.; M & H Valve & Fittings Co., Anniston, Ala.; American Blower Co., Russell Wheel & Foundry Co., Acme Foundry Co., and Michigan Valve & Foundry Co., all of Detroit, and Youngstown Foundry & Machine Co. Before his retirement several years ago, Mr. Moore was an inspector for the Navy Department.

John R. McConnell, 69, former vice president and director of advertising, American Air Filter Co., Louisville, died Aug. 8. He had retired last year after 33 years in the air filter industry. Mr. McConnell was associated with Reed Air Filter Co., Louisville, when it merged with American and other air filter companies in 1929, and became sales manager at that time. He was named vice president in 1938 and advertising director in 1940.

George G. Brown, 60, dean of the College of Engineering, University of Michigan, died Aug. 26, in Ann Arbor. Dean Brown was known internationally for his research and contributions to engineering education. A graduate of New York University, he later received a master's and doctor's degree in engineering from University of Michigan. He joined the university faculty in 1920 as an instructor in chemical engineering, and became a full professor in 1930.

Charles F. Axelson, 93, founder, Axelson Mfg. Co., Los Angeles, died Aug. 2, in Santa Ana, Calif. Mr. Axelson founded the Acme Iron Works in Santa Ana in 1892, and in 1895 moved the firm, which later became Axelson Mfg. Co., to Los Angeles. Axelson Mfg. Co. is now a division of Pressed Steel Car Co., Chicago.

Mathew G. Sternberg, 68, consultant, Continental Foundry & Machine Division, Blaw-Knox Co., East Chicago, Ind., died Sept. 4. For health reasons he resigned early in 1956 as vice president of the division. Associated for 37 years with Continental Foundry & Machine Co., Mr. Sternberg was president of the foundry prior to its acquistion by Blaw-Knox.

Herbert J. Rosen, 72, former president, Griffin Wheel Co., Chicago, died Aug. 22. With the company 56 years, he was president from 1948 to 1953, and then chairman of the executive committee until his retirement in 1956.

John S. Conway, 51, vice president in charge of sales, service and advertising, Koehring Division, Koehring

HERE'S HOW!

- **FASTER MELTING** — one 400 series melts up to 11,000 lbs. of brass or bronze per shift and 6,000 lbs. of gray iron per shift.
- **LOWER MELTING & MAINTENANCE COSTS**—One man can do all the melting work, no daily repairs needed.
- **BETTER FURNACE CONTROL AND VERSATILITY** — No pick-up of tramp elements, and furnace setting is never changed.
- **CONTINUOUS POURING** — no waiting until floors, flasks, boards, etc., are filled with moulds.
- **CLEANLINESS** — Reda Furnaces have passed the most stringent smog-control regulations.

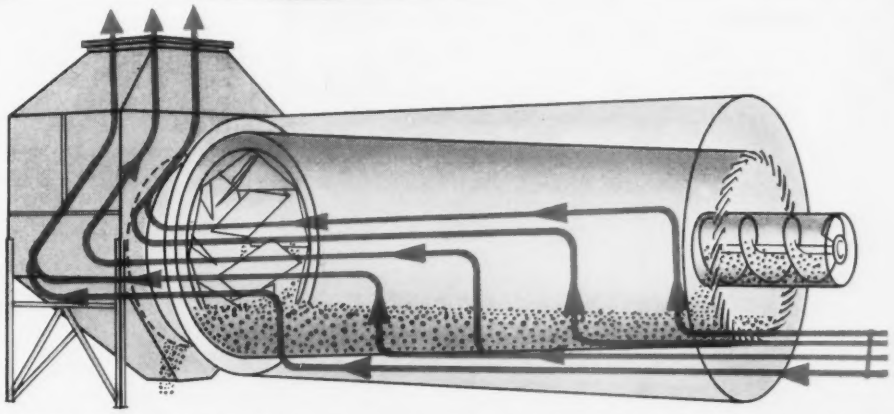
The Reda Furnace is a modern furnace design. It is sturdily constructed, without gadgets, for rugged operation. It is designed to give increased speed and efficiency in melting ferrous and non-ferrous metals. Use of Reda Furnaces has resulted in savings as high as 50% by foundries in various parts of the country.

FURNACE DIVISION WRITE TODAY FOR DESCRIPTIVE BULLETIN

REDA PUMP COMPANY • BARTLESVILLE, OKLA.

Circle 666 on Inquiry Card—Page 51

More sand drying capacity in less space



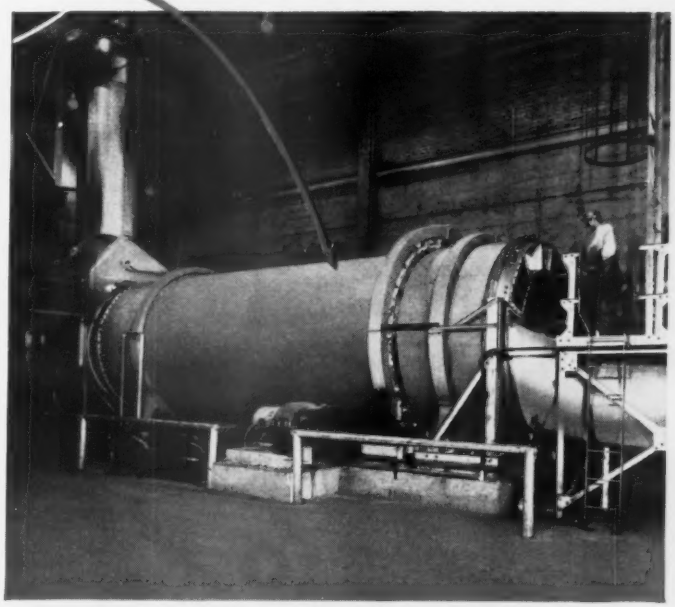
COMMON-SENSE DESIGN of Link-Belt Roto-Louvre dryers assures effective heat transfer. Compact machine has largest volume of air penetrating thin bed of sand near feed end, where greatest evaporation takes place. Gradual heat transfer from gentle rolling action over slowly revolving louvres eliminates spotty over- and under-drying. Sand is discharged at 120 to 135 F, containing a maximum of 0.5% moisture. In installations where temperatures as low as 100 F are required, a combination dryer-cooler can be furnished. Link-Belt builds eight sizes of Roto-Louvre dryers—1 to 60 tph capacities.

Dry, cool core sand from LINK-BELT Roto-Louvre dryer blends readily with core oil

PROPERLY dried and cooled core sand directly affects your core production capacity. That's why it will pay you to investigate the many advantages offered by Link-Belt Roto-Louvre dryers for increasing output—reducing costs.

Roto-Louvre's exclusive design controls temperatures throughout the entire drying cycle—exposes each grain of sand to exactly identical conditions. Uniform drying reduces retention time—permits you to dry more sand. Free-flowing sand is delivered sufficiently cool to mix with core oil without need for coolers. In addition, Roto-Louvre needs less than half the space required by other dryer-coolers.

Get all the facts from your nearby Link-Belt office. Or write for your copy of Book 2423 on Foundry Equipment . . . or Book 2511 featuring Roto-Louvre Dryers.



DRYING UP TO 35 TPH OF SAND, a large midwest foundry installed this Link-Belt Roto-Louvre dryer to provide additional sand capacity for increased production demands. In addition to low-cost efficiency, Roto-Louvre dryers minimize maintenance. Slow speed and the fact that sand rolls over itself, instead of sliding on metal parts, reduces wear.

LINK-BELT HANDLING AND SAND PREPARATION MACHINERY

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

14,555

Produce cleaner castings

... with ladle linings made of J-M 3X Blazecrete® — the hydraulic setting refractory

J-M 3X Blazecrete makes possible cleaner castings because it has great ability to resist penetration and attack by molten metal.

3X Blazecrete . . . the 3000F refractory . . . is easily and quickly applied . . . mix with water like ordinary concrete, and slap-trowel to desired thickness. Hardens without application of heat. Contains no harmful irritants . . . safe even for hand application. 3X Blazecrete is furnished as a dry mix, and may be stored indefinitely without deterioration.

Longer lasting linings can be built with 3X Blazecrete because it is spall-resistant, withstands slagging action and has negligible shrinkage.

Send for free brochure on Blazecrete (RC-28A) describing its properties and uses. To obtain your copy—as well as additional application details—write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

Whether you gun it... *or slap-trowel it...*

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville BLAZECRETE

BUILDS BETTER REFRACTORY LININGS

Co., Milwaukee, died Aug. 17. Mr. Conway joined the company in 1941 and successively served as credit manager, export manager, sales manager in 1948 and in 1952 became vice president-sales.

Fred J. Coulton, 68, secretary-treasurer, City Pattern Foundry & Machine Co., Detroit, died Aug. 11, in Fort Lauderdale, Fla. Mr. Coulton had been secretary-treasurer of the company since he helped to organize it in 1913, when it was called City Pattern Works.

Bert J. Pearson, 65, assistant to the general manager, Strong Steel Foundry Co., Buffalo, died Aug. 27. He was associated with the foundry for 41 years, and was formerly plant manager.

C. C. Smith, 80, president, Waukesha Foundry Co., Waukesha, Wis., died Aug. 15. Mr. Smith founded the company in 1912 and it was later expanded to include a branch in Watertown, Wis.

Arthur H. Stenzel, 71, retired owner, Stenzel Pattern Works, Houston, Tex., died July 31. Mr. Stenzel, whose father also was a patternmaker, started the business in 1913 and retired in 1952.

Walter C. Samuels, foundry supply representative in the Pittsburgh area, the S. Obermayer Co., Chicago, died Aug. 13.

Book Review

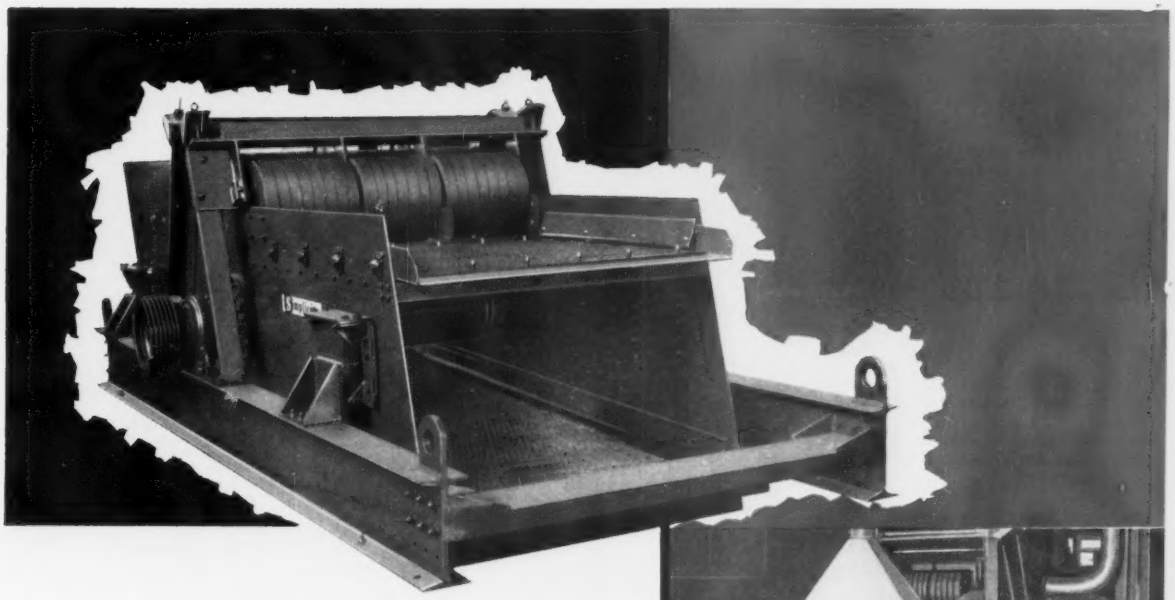
Structural Design in Metals, by Clifford D. Williams and Ernest C. Harris, cloth, 6 x 9 in., 655 pages, published by Ronald Press Co., 15 East 26th St., New York 10, N. Y. Price $8.

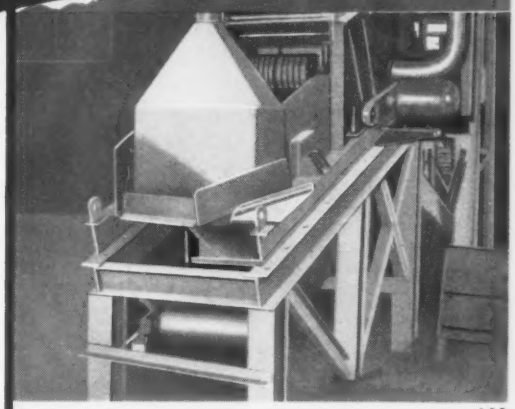
Revised second edition of college textbook incorporates new materials and new illustrative examples reflecting the latest specifications and design methods. Recognition also is given to increasing use of other metals besides steel, such as aluminum and its alloys, and to the concept of structural design in aircraft work. Materials, forms of structures, and types of details are fully treated. Both welded and riveted details are analyzed. Requirements of specifications are discussed and illustrated.

Names Lift Truck Distributor

William H. Ziegler Co., Minnesota equipment distributor since 1914, has been named representative for Yale industrial lift trucks in Minnesota and the ten western counties of Wisconsin.

SALVAGE YOUR VALUABLE MOLDING SAND with a SIMPLICITY RING-TYPE CRUSHER SCREEN





188

You profit two ways with Simplicity's Ring-Type Crusher Screens

- Your used core and molding sand is crushed and screened for re-use in one operation, saving the cost of new sand.
- Transportation and dumping costs of used sand are eliminated.

This unit combines the Simplicity heavy-duty vibrating screen with free-turning cast rings mounted over crushing plates. One to three sets of rings can be supplied, depending upon the maximum lump size to be crushed.

Simplicity ring-type crusher screens are paying their way in foundries producing magnesium, steel, malleable and grey iron castings throughout the United States.

Available in many models and sizes. For complete information write today for the name of our sales engineer in your area; and turn your waste into profits.

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FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario.
FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND 7, MICHIGAN

Circle 669 on Inquiry Card—Page 51

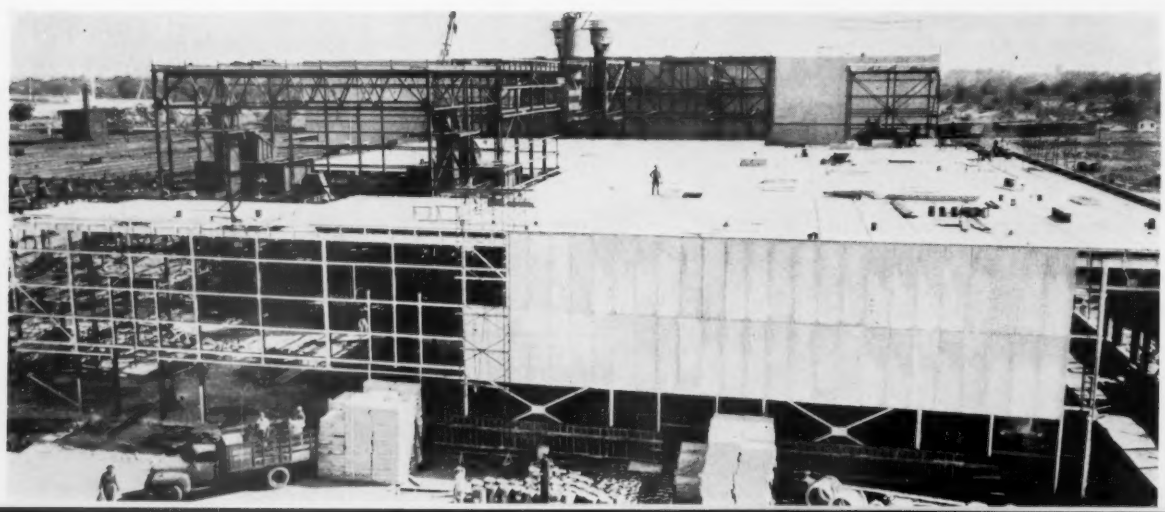
News Views

GOLDEN GALLON: The one millionth gallon of Stevens Liquid Parting was produced recently and shipped in a gold 55-gal drum. While the Frederic B. Stevens Co. has been serving the foundry industry for 75 years, the Liquid Parting is a relatively recent addition to the company's line of products. The company's most recent innovation is the packaging of this parting in aerosol containers

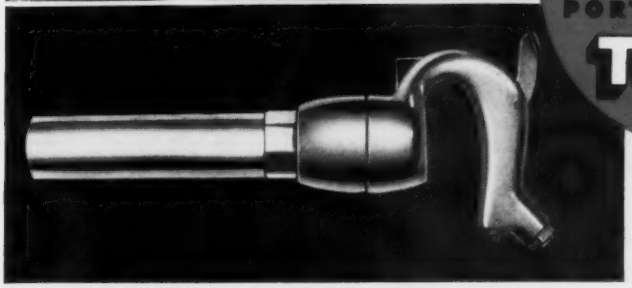
NEW MALLEABLE FOUNDRY: Construction is ahead of schedule on the new malleable foundry at Link-Belt Co.'s Ewart plant, Indianapolis, and it is expected to go into operation in December or January. The foundry will incorporate the latest techniques and mechanization in foundry practices. The Ewart plant of which it will be a part is the largest single unit of the Link-Belt Co.

RESEARCH CENTER: Harbison-Walker Refractories Co., Pittsburgh, has begun construction of a $1 million research center that will house all of the company's extensive research activities. At groundbreaking ceremonies, left to right, are Donald F. Stock, manager of the research center; R. P. Snyder, chief engineer; Earl F. Garber, president, and Raymond E. Birch, director of research

SAFETY RECORD: H. K. Intemann, left, president, Electro Metallurgical Co., Division of Union Carbide Corp., presented the President's Safety Trophy to employees of the Alloy, W. Va., plant recently for having had no disabling injuries during the first half of 1957. Alloy employees will receive individual awards to commemorate their record



Best where the going is toughest!



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Around the Country

NEWS REPORTS FROM

Chicago . . . Detroit . . . Philadelphia . . . Boston

Boston— Gray iron and malleable foundries will increase melt schedules nearly 10 per cent in the fourth quarter. Although improvement in bookings for October is varied, most shops will pour more tonnage than in third quarter and many are scheduled slightly above first-half level. Backlogs are thin, but spot orders for castings are broadening with jobbing shops.

Shops holding to four-day-week operations are calling back molders and in some cases have gone to five-day schedules. Some improvement in machine tool requirements is noted, also in malleable iron fittings; both have been in the doldrums. Textile mill equipment foundries are slow on integrated work; most are seeking additional jobbing tonnage, but one Worcester mechanized plant has been hampered by strikes. Shops producing steel castings have two or three-month backlog.

Pig iron costs are higher for fourth quarter. Mystic Iron Works, Everett, Mass., has renewed five-year contracts with bulk of New England foundries with basic terms substantially the same as covered in former five-year agreements which expired at mid-year. In some cases tonnage-agreement stipulations are lower or more realistic than earlier contracts, negotiated when shortage of pig iron was general. Prices continue to be based on previous quarter costs by the Everett producer.

Yale & Towne Mfg. Co. foundry operation, Stamford, Conn., has been halted; equipment has been sold and will be moved. This is a case where it is "cheaper to take milk than keep a cow". The 17 widely decentralized plants operated by Yale & Towne will buy castings from foundries nearest each operation at competitive prices. Equipment at Stamford included two large cupolas, in addition to a pattern shop. Windsor Foundry Corp., Windsor, Vt., with one 12-ton capacity cupola, will also liquidate. A Vermont scale manufacturer, while increasing aluminum capacity, will move some gray iron operations to Pennsylvania.

Detroit— Chrysler Corp. has converted one of the buildings at its Kokomo, Ind., transmission plant into an aluminum diecasting foundry. It is producing about 15 parts for automatic transmissions built at the Kokomo and Indianapolis plants. The building housing the diecasting operation formerly was used to produce standard transmissions.

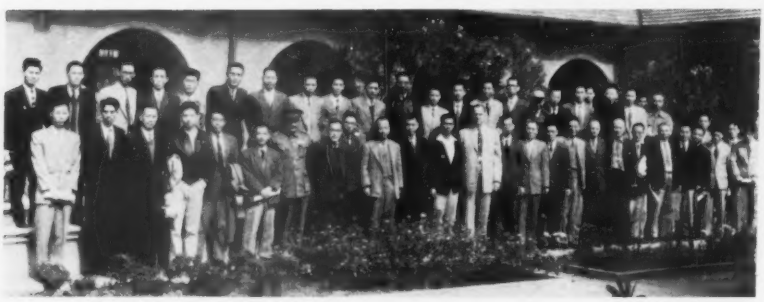
Production at Chrysler's new $400,000 shell molding foundry in the Winfield plant, Detroit, is well under way. Front oil pump housings for automatic transmissions, the low and reverse band drum, and two fuel pump and distributor drive gears formerly made by outside manufacturers are being produced.

Chevrolet Motor Division, General Motors Corp., intends to break ground within the next month for its new aluminum foundry to be built near Massena, N. Y. Manufacturing operations are scheduled to begin in June 1959. The plant will produce aluminum castings for Chevrolet car and truck engines and transmissions. The foundry will obtain molten aluminum from an adjacent Reynolds Metals Co. plant now under construction.

The new foundry will use about 50 acres of a 242-acre site about 8 miles east of Massena. The plant will have about 180,000 sq ft of manufacturing area. An adjoining 100 x 275-ft building will house offices, cafeteria, medical department, locker rooms and similar facilities. Total employment will be about 700.

Recent rumors that 1958 Chevrolet engines would contain shell molded crankshafts are false. Chevrolet will continue the use of forged steel crankshafts.

Chinese University Holds Foundry Conference



GROUP PICTURE above was taken at the first foundry conference to be held at Cheng Kung University, Tainan, Taiwan, Free China. The meeting is one of many sponsored by the new Division of Engineering and Industrial Relations of that university. The division was organized under the leadership of Prof. Merle M. McClure, one of the advisers of the Purdue University Team directing the project. The work is an important part of the foreign aid program.

The foundry conference included talks on sand control, foundry mechanization, metallurgical improvement in castings and the role of the industrial engineer in the foundry. Except for a talk by Prof. C. E. Bullinger, another adviser on the Purdue Team, all of the speakers were Chinese.

Chicago—Chicago high schools made an outstanding showing in the patternmaking and molding division of Ford Motor Co.'s 1957 Industrial Arts Awards. In the 11th annual competition the first four places in molding and eight honorable mentions were won by Chicago students.

Winner of first award and $100, as well as an outstanding achievement award, in molding was Raymond Westberg, 15, of Chicago Vocational High School, for a brass bell. His instructor was Willard Newton.

Second award in molding and $80

15-hp Carrier unit expected to pay for itself in year, ON MAINTENANCE SAVINGS ALONE!

The 78′ Carrier Natural-Frequency Conveyor shown here is about to be hit by two giant molds which will be quickly and efficiently conveyed to a shakeout.

This big mid-western foundry had formerly used a 30-hp "slow-advance — quick-return" reciprocating trough conveyor, mounted on rollers. It was a "brute-force" unit and required constant work to keep it in service. The high temperature of the sand and castings (up to 1500°F.) — two-ton shock loads on the rollers — high stress concentration at the drive — and severe abrasive wear in the many moving parts . . . *all contributed to maintenance and downtime costs in excess of $20,000 per year!*

With just *half* the horsepower, the Carrier Natural-Frequency Conveyor does *twice* the job! It handles surge loads as high as 290 tph. An extra-deep trough contains sand "splash" and eliminates spillage. Stress distribution is uniform because the rugged coil springs supporting the trough are evenly spaced, thus preventing fatigue failure of structural members. And Carrier's patented drive, which is available in NO OTHER CONVEYOR, *permits the conveyor to settle under load so that shocks from 2-ton dumps are not transmitted to the drive bearings!*

Write direct for further information. Address: Carrier Conveyor Corp., 224-A N. Jackson St., Louisville 3, Ky.

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Circle 671 on Inquiry Card—Page 51

an announcement of interest to design engineers

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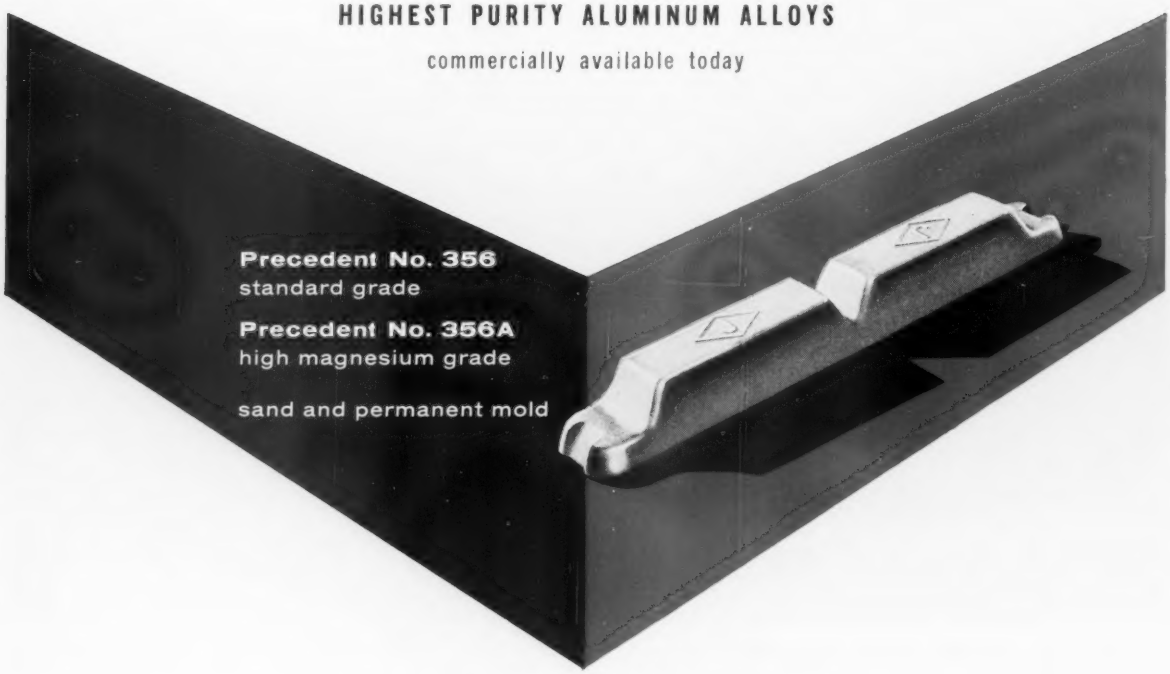

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went to Kenneth Jurek, 16, also of Chicago Vocational, for an aluminum safety sign. His instructor was Henry J. Zehme.

Third award in molding and $60 was won by Joseph Konior, 15, for a brass gear, and fourth award in molding and $40 by Roger Nicosia, 16, for an aluminum drill and tap stand. Both are students at Lane Technical High School and their teacher was Fred H. Dix.

Honorable mentions and $20 went to Ronald Fleck, 15, for a brass bell; Joe Hoh, 15, for bookends; Frank Rees, 16, for a hand plane; Nick Romashko, 16, for a press body; and Timothy M. Rayn, 16, for a casting. All five are from Lane Tech, with L. L. Woodruff the instructor of the first four and Fred H. Dix of the last mentioned. Also given honorable mentions and $20 were Robert Sleva, 16, of Washburne Vocational High School—Irving W. Kiehn, instructor; Frank Jellen Jr., 18, of J. Sterling Morton High School, for pattern and coreboxes for a jig saw base—Paul R. Rohe, instructor; and John Whiteside, 16, of Schurz High School, for bookends—John F. Dix, instructor.

A total of 732 students in Grades 7 through 12, representing 42 states and the District of Columbia, two territories and one foreign country, shared in the $50,000 in awards given annually by Ford Motor Co.

More than 40,000 projects made in public and parochial schools this year were judged in the Industrial Arts Awards and Student Craftsmen's Fairs throughout the country.

The program is designed to encourage fine craftsmanship and ingenuity among the nation's young people. Entries in the competition must be made in school classes under instructor supervision, and the range of the program's 14 divisions enables nearly any school-made project to be eligible.

Last year Don Healas of Ford's Educational Affairs department cited some statistics which testify to the caliber of participants in the competition. National average of high school graduates entering college is 21 per cent. Of winners in the Ford Industrial Arts program, it was said 46 per cent go to college, and 85 per cent follow in the fields in which they won their awards. Exact new figures are not available but the latter two percentages now appear to be on the low side.

Philadelphia—Casting demand is improving slowly — more slowly than generally anticipated. Most gray iron job shops entered the fall season

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AUTOMATIC SAND MIXING SYSTEM NOW MAKES LARGE VOLUME SHELL MOLDING POSSIBLE

Thanks to a Planet designed and installed sand mixing system, one of the midwest's largest foundries can now make shell molds in large quantities.

The system consists of three large bins which stand 60 feet above the floor. The largest bin holds 360 tons of one type of sand. A second bin holds 80 tons of a different sand and the third bin holds resin. The resin bin is filled by means of the receiving hopper and conveyor shown in the foreground of the picture above.

Proper proportions of sand and resin are weighed and delivered automatically to a batching hopper. From the batching hopper the materials are fed by gravity to an automatic mixer where they are thoroughly mixed for delivery to molding machines.

An overhead mold conveyor system installed by Planet in the same foundry also helps secure volume production. It moves molds from the molding machines through the pouring operation and cooling tunnel to shakeout screens.

Let Planet's experienced engineers help you solve your problems — write or call today.

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IT PAYS TO PLAN WITH PLANET

71

with operations averaging no more than four days a week, and in some cases with restricted working forces. Brass and bronze shops did not fare as well, nor have they picked up much since.

Demand for steel castings appears to be the best sustained. Ship propulsion machine requirements continue strong and there is still considerable work for heavy industrial and electrical equipment. Most steel foundries are operating at least five days a week and have backlogs averaging five to six weeks.

In malleable the situation is rather mixed. Demand for small precision castings is holding up well and is well diversified. One eastern Pennsylvania foundry, producing castings of 5 pounds and under, has backlogs running close to 12 weeks, compared with around seven weeks early last June. Manufacturers of malleable pipe fittings, on the other hand, report a general lag, with inventories up; nor is there much doing in the heavy hardware lines.

Gray iron job shops have little in the way of backlogs—practically none in most cases. This is true not only in this area but in northern New Jersey and the New York Metropolitan area as a whole. One large shop in the latter district reports business in both the papermaking equipment and printing machinery fields as fairly good, but off 15 per cent or so from a year ago. There is also a fair volume of specifications for large industrial meters and valves, but a decided drop in housing meters. Machine tool requirements are very slow and needs of the chemical industry are spotty. Various buyers are still going along on inventories. In the printing machinery field some leading manufacturers have been operating largely on inventories since last May.

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It's all there in a letter from Don Alvis, Cleaning Department "Super", and here's the REAL BIG NEWS: Beginning with their initial order for a model 35A Standard twin-wheel, infinitely variable speed snagging grinder in 1948, Golden Foundry has since ordered FOUR MORE... another "proof-of-the-pudding" story for this unexcelled foundry grinder.
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"GOOD WHEEL ECONOMY"
"WILL PAY FOR THEMSELVES IN LESS THAN A YEAR"
"IMPRESSED WITH STURDINESS"
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5 MACHINES IN 8 YEARS!
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SFSA Publishes 1957-58 Steel Foundry Directory

The 1957-58 edition of the *Directory of Steel Foundries in the United States, Canada and Mexico* has been published by Steel Founders' Society of America, 606 Terminal Tower, Cleveland 13, O. It contains the latest information obtainable concerning names, locations, personnel, production and facilities of steel foundries in North America. Producers of all types of steel castings by all applicable casting processes are included.

The first section is devoted to steel foundries in the U. S. A.; the second to United States Government Agencies' listings of steel foundries; the third to Canadian steel foundries; the fourth to Mexican steel foundries; and the fifth to an index of steel foundries by states.

Copies are available from SFSA at $15 each.

Book Review

The Manufacture of Iron and Steel by G. Reginald Bashforth, cloth, 6 x 9 in., 306 pages, published by Chapman & Hall Ltd., 37 Essex St., London W. C. 2, England. Price 45 s.

Revised second edition is aimed to provide students and busy industrialists with a reference book surveying modern iron and steel manufacturing methods and related equipment. Subjects covered include iron ores and their occurrence, blast furnace burden, preparation of iron ores, blast furnace fuels, blast furnace reactions, blast furnace slags, principles of blast furnace design, blast furnace plant and equipment, blast furnace refractories, operation and calculations, other methods of pig iron production, manufacture of ferroalloys and special irons, blast furnace instruments and wrought iron.

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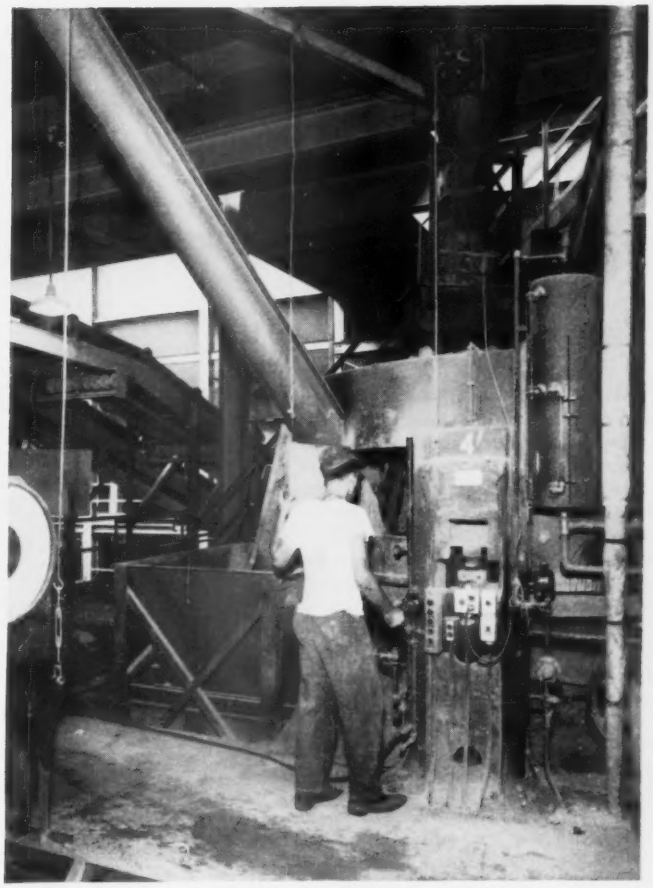

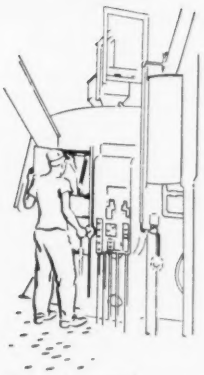

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Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Superstitions"

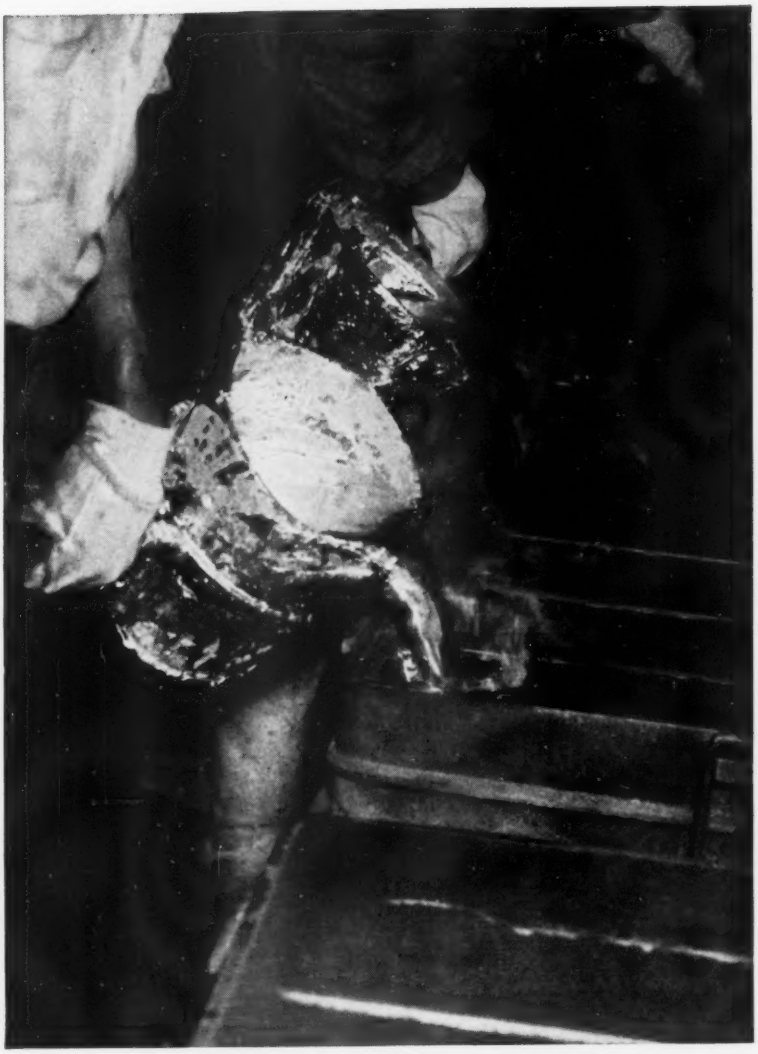
DURING the last 200 years man has made notable progress in his upward climb from witchcraft to science. From the voodoo doctors to our modern medical specialists is a long step. From the ox-cart to the Cadillac can hardly be considered other than progress, although some diehards insist that we were happier with the ox-cart.

Yes, indeed, we are yearly reaching higher levels of both thought and performance. I presume that witchcraft is still practiced in some isolated parts of the earth, but to the best of my knowledge, there are no professional witches operating in my neighborhood.

The witch hunts of old Salem have been described by many writers and historians in such detail and agreement that there is little question of their authenticity. The witchcraft of those days represented a stage in man's mental development which was undoubtedly reflected not only in his religious life, but in most of his other activities as well. Although I can discover no definite records to support the belief, I am quite sure that even the foundry practice of that period was affected by the prevailing superstitions.

Changing the Luck—Some of my older readers will remember the days when a molder would put on his coat and go home simply because he couldn't get a "lift," or couldn't find the right length of gaggers, or a core had broken in his hands, or the boss had been unusually gruff, or for any one of a dozen other excuses.

He usually would reason that he should have stayed in bed and avoided this "unlucky day." Some molders resorted to whiskey or had other infallible methods of "changing their



Here are our published performance specifications for Federated Tenzaloy: Castings aged 10-14 days at room temperature.

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Elongation (in 2 in.)	4-5%
Brinell Hardness No.	74
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Notched	3
Unnotched	14
Electrical Conductivity	35%

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Do you hear meaningless claims when you buy self-aging Aluminum Alloys?

Federated Tenzaloy is the most widely used of all high-strength, self-aging aluminum alloys because it has the highest yield strength, and it has the best all-around combination of properties. Yield strength is the true measure of a metal's ability to take punishment, regardless of other claims that are made.

When you buy Federated Tenzaloy, you can be sure it will perform as well as its specifications indicate. Tenzaloy is produced under the strictest quality-control procedures, developed by ASARCO's Central Research Laboratory, where refining and testing techniques control impurities to parts per million, if required.

Hundreds of foundries and manufacturers use Tenzaloy when castings with superior properties are desired — and to replace ordinary alloys which require additional operations to meet required properties.

Why not ask your Federated field man to tell you who uses this metal and how? He will be around to see you soon, and it will benefit you to talk to him.

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luck." Call it what you will, it was still superstition!

This writer remembers most vividly a once-current expression, "What's the matter with me? I can't get a decent lift!" He blamed himself, not the sand or equipment. Of course, he knew whether the sand was too wet, dry, or weak, and he also knew that by remixing it and making certain arbitrary adjustments, he could produce a saleable casting. But having lost some of his self-respect with his first stick-down, it was easier to attribute the entire situation to "bad luck," put on his coat and go home. He probably had another reason for going home, anyway.

A man can believe anything he wants to believe. The history and progress of man's thinking in all of its phases is a study of unparalleled interest. In ancient Greece every success or failure was attributed to the gods—not one, but a whole heaven full of gods. A lost casting was never the result of poor molding or inadequate sand; it was due simply to the fact that the god who watches over foundries had not been properly appeased.

True, the blood of a sheep had been poured into the mold just prior to closing, but perhaps the sheep was too old, or this particular job might have required the blood of two sheep. There were incantations and prayers offered, and various devices resorted to in the hope of pacifying the offended deity. Result: A successful second attempt! Could you expect that foundryman, or his son, or his son's son, to question this orthodox procedure in foundry practice?

Two hundred years is a comparatively short time in the recorded history of man, yet in even this brief span much once-popular superstition has been dissolved in the acid of thought.

Superstition Dies Hard—We pride ourselves in the belief that we are no longer actuated by superstition, that we no longer believe in soothsayers, and that good or bad castings are not due to supernatural influence. Yet is it entirely true that we have completely freed ourselves, in this short space of two hundred years, from the bigotry, prejudice, and fears so deeply ingrained during the preceding 6000 years? Is there a carryover from witchery still evident in the foundry practice of 1957? I believe that there is, and that it is dying hard. Of course, it is a matter of degree, which often defies definition, but nevertheless it exists.

Some foundrymen still profess to believe in "luck" and "the law of averages." They insist that it is necessary to lose a certain percent-

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NARCOLINE
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It successfully resists the erosive and corrosive action of metals and slags, eliminating refractory inclusions from the casting.

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Facilitates Metal Flow

It resists graphite burn out under operating conditions, and maintains a lasting lubricated surface for easy metal flow.

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Assures Easy Slag Removal

It resists the wetting action of molten metal and slag, permitting ladles to be cleaned of solidified metal and slag with little effort.

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age of castings daily. The percentage, I presume, depends upon the foundryman's "luck." One man expects and gets a loss of 15 per cent and remains in business. Another insists that he must close his doors if scrap consistently exceeds 3 per cent.

The history of foundry sand practice is no less interesting than that of the men engaged in it. Developed as an art, the ancient practitioners enjoyed considerable success. Despite all of the hocus-pocus and secret formulas, propitiation of the gods and whatnot, many of their methods were harbingers of the science to come.

Cellini Worked at It — Cellini studied available clays, carefully selected his collapsing agents, and was extremely concerned with his manner of drying a large statuary mold, especially in the lower extremes. If statuary molding is ever reduced to an exact science, Benvenuto Cellini should be honored as the father of it. The use of horse manure, hayrope, stale beer, hen's eggs and molasses water could prove exciting subject matter for the chapter following Cellini.

Paul Revere undoubtedly had recourse to all of the above, and was considered a leading foundryman of Boston, yet we remember him only because of that midnight ride. Moral: If you would seek fame, give the foundry a wide berth and get a horse!

To the best of my knowledge, sacrificial blood is no longer used in molds to appease the gods. Horse manure and stale beer have also lost their foundry popularity. The horseshoe is seldom seen over the foundry door. And the boys in our laboratories are gradually convincing us that we need no longer believe in witches.

Book Review

Better Wage Incentives, by Phil Carroll, cloth, 230 pages, 6 x 9 in., published by McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. Price $4.75.

This book is aimed to show the need for more and better incentives, especially for indirect people and supervisors, and how these may be brought about in the average company. A method of setting up and maintaining a good incentive program is shown. Various types of incentive grievances are emphasized, with help given as to how to prevent them and what to do should they arise. Incentives for foremen, how to prepare for incentive arbitration if it becomes inevitable and the economics of incentives are covered.

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REDUCE handling costs
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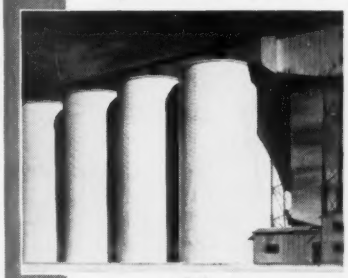

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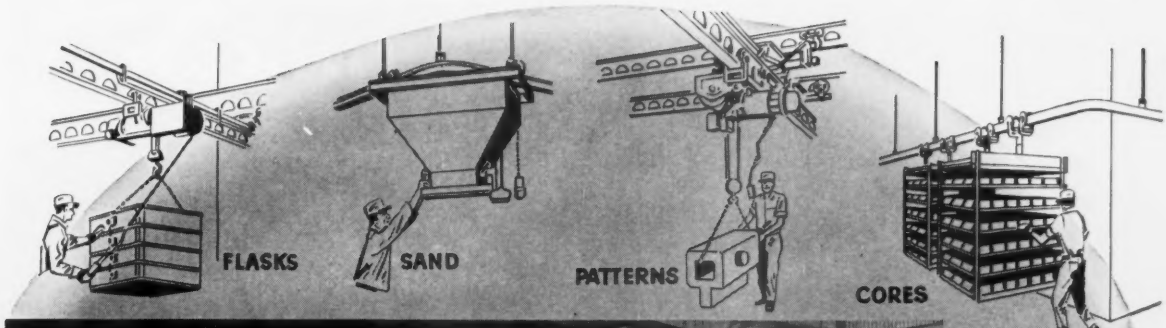
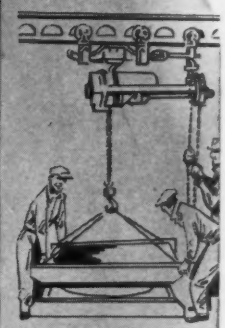
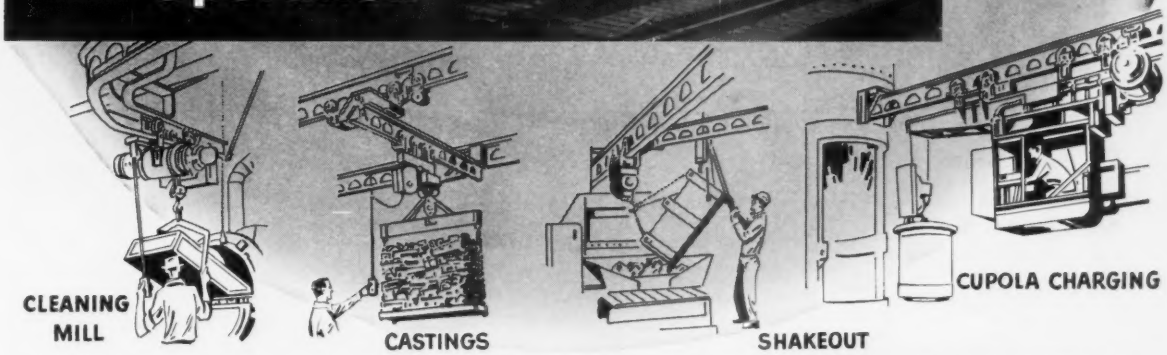


Versatile Cleveland Tramrail *Speeds* Every Foundry Operation





Wherever materials must be lifted and moved, Cleveland Tramrail overhead materials handling equipment can save time, make the work easier and safer, speed production and cut costs.

Because 150 to 250 tons of various materials must be handled to produce a ton of finished castings, foundries find Cleveland Tramrail particularly advantageous. In many cases the use of Cleveland Tramrail means the difference between profit and loss. Because it affects the price of the finished product so greatly, it will be a key factor for numerous foundries in obtaining orders during periods when the competitive situation is keen.

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

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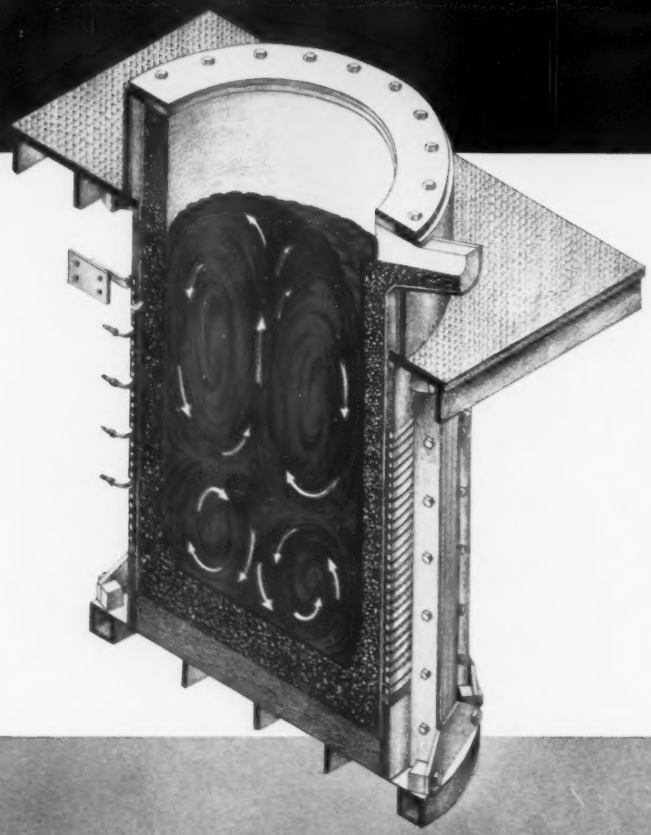
at the Show*

AJAX-JUNKER



CORELESS 60 CYCLE INDUCTION MELTING FURNACE

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Amphitheatre
Chicago, Ill., Nov. 4-8
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This new principle was perfected in Europe over the last seven years. Over 100 Junker furnaces are now in use. AJAX-JUNKER designs are based on latest experience, using American components and practices throughout.

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DUCTILE AND ALLOY IRON CASTINGS
RECOVERY OF IRON TURNINGS
RECOVERY OF ALUMINUM SCRAP

Available sizes range from 1 to 10 tons, with normal melting cycles from 2 to 4 hours. Power ratings are 200 kw through 1500 kw.

AJAX USA

60 CYCLE INDUCTION MELTING

ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

Circle 680 on Inquiry Card—Page 51

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1955	827,162	165,482	298,349	355,203	.....
1956					
June	58,189	13,448	19,067	25,027	102,068
6 mo.	412,888	91,768	130,791	186,790	.....
July	52,955	12,398	16,388	23,491	106,620
Aug.	61,407	13,100	18,067	29,553	109,352
Sept.	62,503	12,354	17,855	31,640	111,785
Oct.	74,209	14,389	21,120	37,782	110,818
Nov.	69,741	14,333	20,673	33,929	113,356
Dec.	67,333	13,391	20,557	32,931	118,185
Total	801,036	171,733	245,451	376,116	.....
1957					
Jan.	72,999	14,201	20,963	37,194	116,088
Feb.	69,451	13,366	21,707	34,311	107,869
Mar.	74,527	13,914	22,974	37,521	107,963
Apr.	68,284	14,287	20,376	33,493	98,113
May	65,108	12,705	20,708	31,602	94,748
June	58,547	11,585	17,180	29,700	88,086
6 mo.	408,916	80,058	123,908	203,821	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1955	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
June	75,635	45,022	66,300	26,791	9,335	5,513	86,247
6 mo.	513,129	298,489	444,047	246,886	69,082	38,885	.....
July	54,340	31,300	45,977	26,881	8,363	4,419	92,078
Aug.	74,422	43,479	62,867	36,759	11,555	6,720	91,883
Sept.	69,380	41,902	59,071	35,534	10,309	6,368	92,553
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....
1957							
Jan.	85,977	51,508	71,689	43,401	14,288	8,107	93,886
Feb.	78,028	46,729	65,411	39,590	12,617	7,139	90,725
Mar.	78,013	48,311	64,560	23,915	13,453	7,666	89,431
Apr.	80,271	51,320	65,990	42,810	14,281	8,510	83,116
May	76,504	46,277	63,058	38,072	13,445	8,205	79,787
June	72,556	44,639	59,829	36,892	12,727	7,747	76,331
6 mo.	471,349	288,784	390,537	224,680	80,811	47,374	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1955	1,008,898	905,867	63,111	.....
1956				
June	78,921	70,260	5,052	55,019
6 mo.	536,346	479,152	34,657	.....
July	60,926	55,027	3,193	59,661
Aug.	77,619	70,479	3,805	56,364
Sept.	72,109	64,887	3,930	56,990
Oct.	81,049	73,058	4,104	54,363
Nov.	72,866	65,022	4,114	52,643
Dec.	65,198	57,929	3,769	56,556
Total	966,113	865,554	57,572	.....
1957				
Jan.	82,025	73,202	4,510	57,422
Feb.	72,084	64,346	4,188	54,133
Mar.	77,418	69,258	4,445	49,135
Apr.	77,167	69,141	4,316	48,148
May	75,347	67,251	4,421	46,791
June	70,959	63,910	3,590	44,232
6 mo.	455,000	407,108	25,470	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1955	27,854	25,294	....
1956			
June	2,949	2,765	7,850
6 mo.	18,092	16,677	....
July	2,810	2,666	7,937
Aug.	3,059	2,860	8,201
Sept.	3,079	2,863	8,193
Oct.	3,442	3,187	7,893
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	....
1957			
Jan.	3,207	3,017	8,245
Feb.	2,661	2,473	8,276
Mar.	2,970	2,804	7,690
Apr.	2,896	2,723	7,542
May	2,832	2,706	7,188
June	2,973	2,817	6,765
6 mo.	17,539	16,540	....

PRODUCTION WORKERS

	May 1957	Apr. 1957	May 1956
Estimated Number			
Ferrous	197,900	199,900	208,000
Nonferrous	63,300	65,600	63,800
Average Weekly Earnings			
Gray Iron	$2.56	$2.78	$2.62
Malleable Iron	$3.67	$2.01	$1.00
Steel	95.82	96.98	96.10
Nonferrous	90.40	89.95	87.29
Average Weekly Hours			
Gray Iron	38.4	38.5	40.7
Malleable Iron	39.1	38.5	39.9
Steel	41.3	41.8	42.9
Nonferrous	40.0	39.8	40.6

Source: Bureau of Labor Statistics.

GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

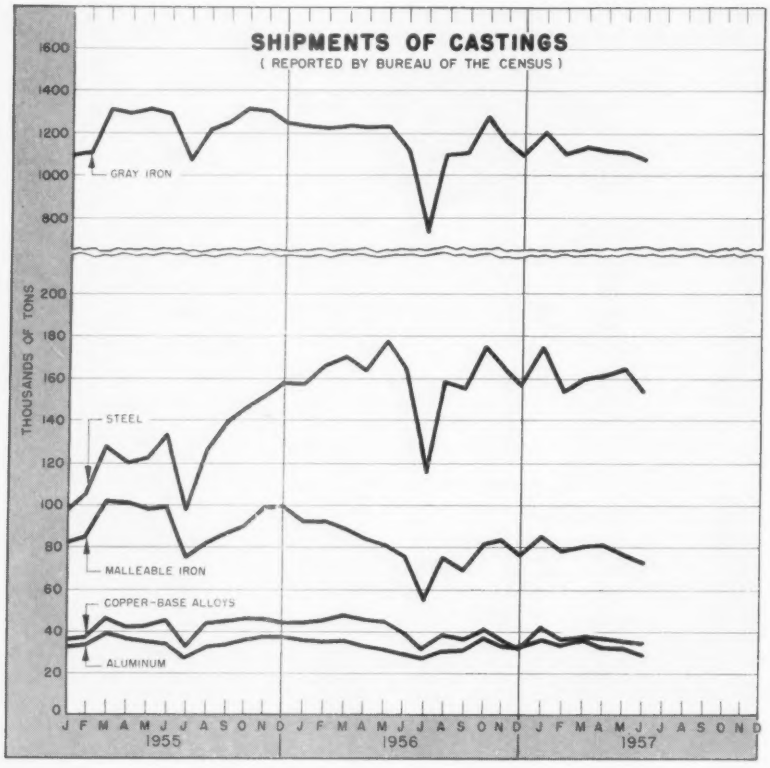
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1955	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
June	1,152,156	686,896	656,778	298,578	217,135	102,405	34,028	170,122	74,093	1,041,315
6 mo.	7,325,479	4,198,806	4,340,831	1,915,933	1,451,742	765,021	221,930	890,635	420,341	.....
July	762,611	487,736	509,702	241,771	9,556	7,003	32,484	144,964	65,905	1,109,069
Aug.	1,103,195	671,523	639,953	293,673	170,857	89,589	31,712	180,249	80,424	1,074,461
Sept.	1,109,943	648,784	623,743	282,824	233,823	117,708	35,361	151,081	65,935	1,037,283
Oct.	1,274,734	734,384	749,200	331,069	252,203	134,265	30,978	171,377	70,976	996,351
Nov.	1,175,572	634,856	720,263	303,938	251,262	131,321	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	254,703	136,584	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	2,624,146	1,381,490	406,191	1,746,902	817,762	.....
1957										
Jan.	1,213,215	642,317	761,697	320,058	261,961	136,456	31,139	101,069	57,346	904,860
Feb.	1,103,118	582,010	705,585	302,514	230,126	115,525	30,079	89,146	48,182	931,054
Mar.	1,133,146	604,481	713,767	305,104	214,775	98,694	36,995	108,158	59,451	934,847
Apr.	1,120,349	611,443	699,395	298,319	192,199	88,390	36,979	128,710	63,066	899,074
May	1,112,096	625,496	674,460	291,557	192,336	92,659	34,406	141,685	69,209	879,825
June	1,058,464	599,494	630,513	274,115	193,640	94,860	32,087	131,360	70,864	853,012
6 mo.	6,740,388	3,665,241	4,185,417	1,791,667	1,285,037	626,584	201,685	700,128	368,118	.....

STEEL CASTINGS—SHIPMENTS

(Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1955	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
June	164,661	129,147	31,296	122,483	95,621	28,801	42,178	33,526	2,495	597,103
6 mo.	1,000,657	778,967	185,498	745,079	573,785	143,225	255,578	205,182	12,173	.....
July	117,984	96,350	19,833	88,971	72,837	18,545	29,013	23,513	1,288	611,233
Aug.	159,831	127,001	32,965	119,025	94,257	30,601	40,806	32,744	2,364	586,496
Sept.	155,046	121,705	33,496	116,905	91,266	31,314	38,141	30,439	2,182	562,937
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Jan.	169,240	133,826	30,090	125,389	98,533	27,739	43,851	35,293	2,351	519,575
Feb.	154,932	121,667	27,181	114,805	89,480	25,060	40,127	32,187	2,121	511,806
Mar.	160,054	124,416	29,968	121,089	93,466	27,683	38,965	30,950	2,285	503,407
Apr.	162,498	124,549	29,708	122,894	93,512	27,624	39,604	32,037	2,084	497,632
May	164,575	125,431	32,840	124,840	94,635	30,926	39,735	30,796	1,914	504,990
June	153,647	119,353	31,338	116,759	91,009	28,766	36,888	28,344	2,572	494,267
6 mo.	964,946	749,242	181,125	725,776	560,635	167,798	239,170	189,607	13,327	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1955
1956
1957

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1955	75,150,247	76,266,385	3,154,052
1956			
June	6,235,691	6,163,668	214,484
6 mo.	39,882,014	38,873,980	1,507,729
July	2,301,442	1,596,570	193,431
Aug.	5,614,997	5,281,627	225,978
Sept.	6,453,229	6,609,309	211,015
Oct.	6,742,483	6,951,386	253,147
Nov.	6,328,272	6,681,074	237,330
Dec.	6,615,935	6,959,900	224,452
Total	73,938,372	72,953,846	2,853,082
1957			
Jan.	6,857,640	7,096,024	241,014
Feb.	6,211,845	6,302,583	228,569
Mar.	6,894,121	6,803,311	232,266
Apr.	6,436,273	6,396,900	226,698
May	6,632,519	6,521,817	219,675
June	6,362,448	6,318,390	188,462
6 mo.	39,394,846	39,439,025	1,336,684

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	20,769
Mar.	28,310	21,948
Apr.	25,808	23,507
May	23,437	22,037
June	18,842	18,888
July	17,364	16,695
Aug.	23,812	.....
Sept.	20,929	.....
Oct.	23,045	.....
Nov.	21,818	.....
Dec.	18,046	.....
Total for year	274,096	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1955	778,000	493,244	.....
1956			
June	47,775	31,983	61,809
6 mo.	358,918	232,272	.....
July	42,227	27,301	64,806
Aug.	52,321	33,281	73,411
Sept.	46,340	33,967	79,390
Oct.	65,450	41,943	75,706
Nov.	64,972	39,718	74,623
Dec.	58,111	36,090	75,293
Total	688,339	444,577	.....
1957			
Jan.	67,964	42,189	75,503
Feb.	59,793	36,580	74,739
Mar.	61,378	40,593	64,466
Apr.	54,982	34,801	59,534
May	53,565	35,676	66,712
June	49,356	33,206	64,137
6 mo.	347,038	223,045	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1956	1957
Jan.	195.6	117.9
Feb.	169.0	188.4
Mar.	152.7	127.0
Apr.	135.2	101.1
May	207.0	136.2
June	156.7	187.5
July	110.3	....
Aug.	188.3	....
Sept.	114.7	....
Oct.	122.2	....
Nov.	121.0	....
Dec.	115.6	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace Cupola Total	Air Total	Electric Total
1955	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Apr.	6,490,680	862,233	96,514	842,216
4 mo.	26,258,154	3,587,719	428,397	3,420,807
May	6,491,567	855,007	104,485	899,967
June	5,994,989	776,299	87,525	831,456
July	1,986,613	621,064	56,071	399,441
Aug.	5,453,927	803,123	92,200	807,131
Sept.	6,231,017	738,824	84,627	841,783
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
Dec.	6,264,955	722,320	82,160	851,770
Total	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Jan.	6,630,804	874,764	102,782	927,499
Feb.	6,038,436	804,185	93,902	834,843
Mar.	6,294,038	814,372	92,534	903,149
Apr.	5,816,309	835,027	97,289	807,922
4 mo.	24,799,587	3,328,348	386,507	3,473,413

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
June	6,387,608	213,769	331,871	5,277,488	614,480	5,642,004	379,803	22,039	23,460
6 mo.	40,730,564	1,293,191	2,035,621	33,526,844	3,924,908	36,247,594	2,506,437	140,976	112,736
July-Aug.	6,191,039	327,077	382,633	4,854,879	616,450	963,749	303,341	14,702	5,582
Sept.	6,873,352	236,809	316,590	5,636,288	683,665	4,618,718	404,948	22,719	17,604
Oct.	7,246,650	245,762	321,188	6,001,279	678,421	6,053,147	366,848	19,642	18,239
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	60,571,150	4,419,655	242,144	190,386
1957									
Jan.	7,209,547	135,608	344,073	6,081,137	648,699	6,482,472	423,660	22,989	20,431
Feb.	6,596,133	154,543	294,491	5,414,732	730,794	5,860,099	369,206	20,743	19,443
Mar.	7,179,100	168,650	347,451	6,008,135	654,864	6,155,334	370,915	20,241	23,259
Apr.	6,810,102	162,023	329,180	5,686,507	632,392	5,586,587	369,359	20,495	19,756
May	6,877,052	258,638	313,583	5,720,212	584,619	.....	.....	.....	.....
June	6,593,326	243,789	318,906	5,436,203	594,428	.....	.....	.....	.....
July	6,625,901	221,929	336,590	5,515,736	551,646	.....	.....	.....	.....
7 mo.	47,889,558	1,345,180	2,284,274	39,862,662	4,397,442	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.

"We have been well pleased..."

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VACUUM METALS CORPORATION
DIVISION OF CRUCIBLE STEEL COMPANY OF AMERICA
P. O. BOX 977 SYRACUSE 1, N. Y.
SYRACUSE 8-2571

March 27, 1957

Norton Company
Worcester 6
Massachusetts

Gentlemen:

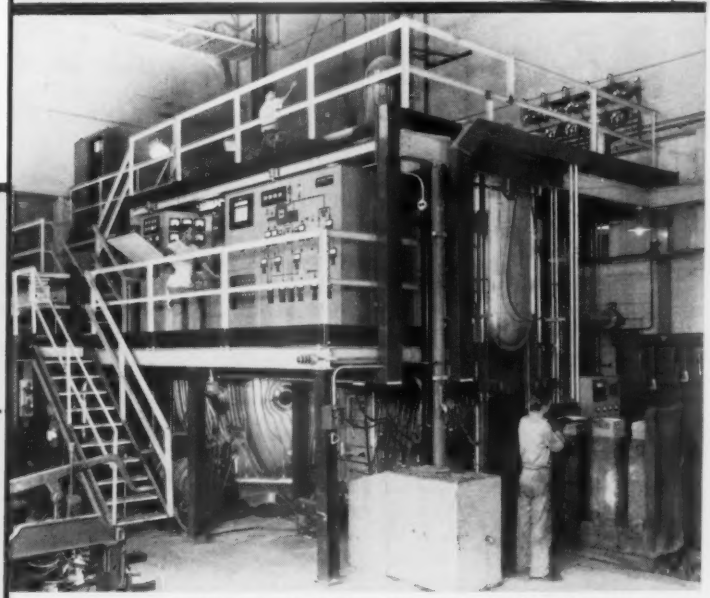
I am enclosing a general view of our newest vacuum melting furnace and a view of the crucible during a melt. This furnace is the largest high vacuum induction furnace in the country and has a capacity of 3000 pounds per heat.

We have successfully used a Norton ramming mix for rammed linings in this and in our 700 pound furnace. Your prefired shapes of Magnorite and Alundum have been used for pouring lips and pouring tubes. Your refractory ramming mixes have been used as a backing for Norton Magnorite and Alundum crucibles in laboratory furnaces for nearly ten years. We have been well pleased with the quality and performance of your products.

Very truly yours,

A. E. Franks
A. E. Franks
Division Superintendent

AEF/a
cc: Michael Stumm



Largest of all high vacuum induction furnaces in the U.S. The accompanying letter from Vacuum Metals Corporation, a Division of Crucible Steel Company, describes how Norton refractory cements and prefired shapes aid in the advanced performance of this huge, modern metal-melting equipment.

"Gadgeteering"

Kissin' Kin to

AUTOMATION

Webster defines our slang expression "a gadget" as "a device for doing something; especially, a part of machinery." It's kissin' kin to automation.

Many of the marvels in America's production lines are "gadgets" dreamed up by men tired of doing things the hard, slow way.

We manufacture air-powered work units to make the job of the methods engineer easier. With these integrally controlled power units he can eliminate many cams, gears, levers and mechanical linkages and perform an almost unlimited range of repetitive pull, push or lift motions, smoothly, economically, and in perfect synchronization with any related movement. With them he can convert existing machinery into faster, automatic units, or he can build in his own tool room low cost, highly efficient special purpose machines.

Like to know more?

These free four-color booklets will give you a quick picture of what Bellows "Controlled-Air-Power" work units can do for you. Ask for Bulletins BM-25 and ML-3. Address: Dept. FO 1057, The Bellows Co., Akron 9, Ohio. In Canada, Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

The Bellows Co.

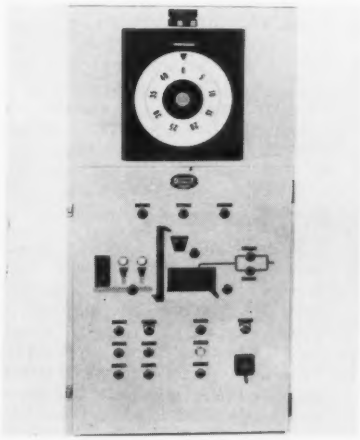
AKRON 9, OHIO

MANUFACTURERS OF "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

7668

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 214



SAND TEMPERING UNIT

No. 3917 combination end point moisture controller and cycling system automatically adds the proper amount of water to each batch of molding sand and then cycles each stage of the mixing operation. Claimed advantages are high degree of accuracy of moisture measurement; batch size need not be constant; moisture content can be changed by turning a calibration knob; three-way operation with automatic, semiautomatic or manual controls on a single selector switch; signal light panel permits operator to follow sequence of operation at a glance from a distance; variable sequence and operating time can be achieved without rewiring, and solenoid valves can be replaced rapidly when necessary. Made by **Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 401—Page 214

CORE BINDER

Fast-acting core binder is made up of a resin base Hy Ten Quik Set 217 and Hy Ten 218 accelerator. The binder sets cold in 15 minutes to 3 hr depending on size, sand temperature, and formula. No ramming and minimum rodding is required. Baking time is said to be reduced to one-half that required for oil-sand cores. Made by **E. F. Houghton & Co.**, 303 West Lehigh Ave., Philadelphia 33, Pa.

For More Details Circle No. 402—Page 214

DIE CASTING MACHINE

High-speed die casting machine that will handle shot capacities up to 4 lb is available in two models—150Z hydraulically operated plunger goose neck type for zinc, tin, and lead and 150A cold chamber type for aluminum, brass, and magnesium. Either standard or fire-resistant fluids may be used in hydraulic unit. Made by **American Die Casting Machinery Co.**, 1517 West Thomas St., Chicago 22, Ill.

For More Details Circle No. 403—Page 214

CLEANING TABLE ROOM

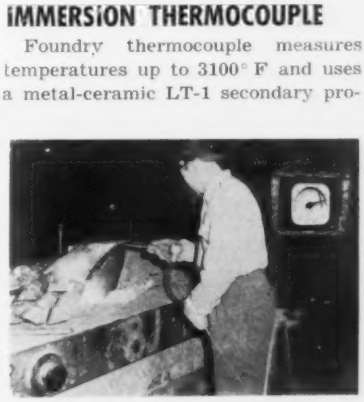
Small 4-ft Rotoblast table room is designed for cleaning all types of work in foundries and other plants that require a small flexible machine for a wide range of cleaning operations. Castings up to 48 in. diam x 24 in. high can be blasted in the unit. Loads up to 4000 lb can be handled. The table is equipped with a cast labyrinth abrasive sealing system

which makes the cabinet abrasive-tight without rubber gaskets. For loading, a single door opens to expose half of the rotating work table. An overhead Rotoblast wheel will throw 15,000 lb of abrasive per hour. An optional unit with a slightly larger motor will throw 22,000 lb per hour. A self-contained automatic elevator and separator cleans used abrasive for recirculation.—Made by **Pangborn Corp.**, 1400 Pangborn Blvd., Hagerstown, Md.

For More Details Circle No. 404—Page 214

IMMERSION THERMOCOUPLE

Foundry thermocouple measures temperatures up to 3100° F and uses a metal-ceramic LT-1 secondary pro-



tecting tube, a vitrified alumina primary tube and a platinum-platinum 10 per cent rhodium thermocouple. A curved stainless steel tube of any required length leads to a wooden grip and the thermocouple assembly head. The LT-1 tube reportedly will withstand about ten dips in molten steel between 2700 and 3100° F. Lower temperatures will give proportionately longer life.—Made by **Bristol Co.**, Waterbury 20, Conn.

For More Details Circle No. 405—Page 214

CORE SAND DRYERS

Counterflow dryers for drying core sand are available in several sizes from 32 to 96 in. or larger diams x

10 to 40 ft lengths. Dryers have a cold end cowl design and externally replaceable bottom liners. An I-beam frame carries the trunnion bearings and assemblies. Interior spiral flights and lifters provide an efficient heating pattern. Dryers may be fired with natural gas, oil atomized by steam, or by low-pressure burner. Drive motor size depends upon size of dryer. Made by **Madsen Works, Baldwin-Lima-Hamilton Corp., Construction Equipment Division,** Box 38, La Mirada, Calif.

For More Details Circle No. 406—Page 214

PATTERN LETTERS

Pattern and tablet letters, foundry trademarks, emblems, and special lettering are made from engraved metal dies to insure letters that will draw cleanly from all types of molding materials. Three new styles—Ribbon, Futura and Moderne—have been added recently to company's line of 41 styles. Letters in sizes from 3/32 to 6 in. are available from stock. Special sizes and types are produced on short notice. Made by **Canton Products,** 1800 Brownlee Ave., N.E., Canton 5, Ohio.

For More Details Circle No. 407—Page 214

COREBOX CLEANER

SCO-70 Carb-Off corebox and pattern cleaner is a nonflammable organic solvent with wetting, emulsifying and disbursing agents, inhibitors and thickeners and has been compounded for rapid removal of carbon buildup from shell coreboxes and shell mold patterns. It reportedly is noncorrosive to aluminum, magnesium, brass, iron, and steel. Material contains no highly toxic chlorinated solvents, yet should be used with caution. Made by **Shallway International Corp.,** 1450 University Ave., Palo Alto, Calif.

For More Details Circle No. 408—Page 214

CRUCIBLE WASH

Beryllium oxide crucible wash is for coating graphite crucibles used in melting uranium-base alloys for nuclear applications. It is said to hold carbon pickup to approximately 100 parts per million. Coating also has been found advantageous when melting above 1600° C. Wash consists of high-purity beryllium oxide powder mixed with water and a binding agent. It is applied either by painting or by placing a small amount inside the crucible and rotating the crucible until a sufficient amount has adhered to the surface. After coating, the crucible is baked at 200° F for 8 to 10 hr. Made by **Beryllium Corp.,** Reading, Pa.

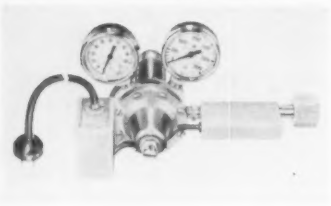
For More Details Circle No. 409—Page 214

REFRACTORY CEMENT

Cracks between the sleeve brick on stopper rod assemblies reportedly are prevented through use of a stiff consistency refractory cement. Ironton Red I cement has no drying shrinkage to cause cracks, does not flake off during drying, has high dry and fired strengths. Material is shipped in 100 or 200-lb drums containing a minimum of water for use as a bonding mortar. Made by **Ironton Fire Brick Co.,** Ironton, Ohio.

For More Details Circle No. 410—Page 214

Heated Regulator Stops CO_2 Valve Freezing



ELECTRICALLY HEATED pressure regulator prevents freezing of cylinder valves caused by fast withdrawal of gas in the CO_2 process. According to the manufacturer, foundrymen have found that by using the regulator it is no longer necessary to manifold cylinders to combat the freezing problem. As soon as the regulator is coupled to the cylinder, the heater automatically is in operation.

The regulator is equipped with two heating elements, one on the inlet side to heat the gas entering the regulator and one mounted on the bottom plug to heat the valve area within the regulator itself. A thermostat controls both heating elements. The inlet has a standard CO_2 tank adapter with 0.830-14 right-hand threads.

It is equipped with a 3000-psi primary pressure gage and a 100-psi secondary pressure gage. For secondary pressures up to 450 psi another electrically heated model is available.—Made by **C. A. Norgren Co.,** 3400 South Elati St., Englewood, Colo.

For More Details Circle No. 477—Page 214

LITERATURE

Airless Blast Cleaning

Vol. 17, No. 4, Wheelabrator Digest, presents a series of photographic case history studies of industrial applications where airless blast cleaning equipment is handling objects of all types, weight, size and shape. — **Wheelabrator Corp.,** 1102 South Byrkit St., Mishawaka, Ind.

For More Details Circle No. 411—Page 214

Gas Burner

Specifications, typical applications and descriptive information on Series M miniature premix burner for small industrial and commercial heat applications and for piloting larger gas burners are found in bulletin 2381.—**Maxon Premix Burner Co.,** Muncie, Ind.

For More Details Circle No. 412—Page 214

Dust Eliminators

Sizes, dimensions, operating advantages and maintenance features of line of vertical rotor type dust and fume eliminators of either manual or conveyor cleanout design are found in bulletin VRU-4-57.—**Schmieg Industries Inc.,** Box 4701, Detroit 34, Mich.

For More Details Circle No. 413—Page 214

Crucible Maintenance

No. 9 in series, "Getting the Most from Crucible Melting," covers the proper care and use of crucible furnaces for the die casting and permanent molding industry.—**Crucible Manufacturer's Association,** 11 West 42nd St., New York 36, N. Y.

For More Details Circle No. 414—Page 214

Foundry Sands

Fiftieth anniversary booklet presents pictorial story of the production facilities available to provide the foundry industry with a variety of sand to meet industrial requirements.—**Manley Sand Co.,** Rockton, Ill.

For More Details Circle No. 415—Page 214

Carbon and Graphite

Application information, key characteristics and information on grades, sizes and properties of graphite and carbon are presented in bulletin AD.—**Speer Carbon Co.,** St. Marys, Pa.

For More Details Circle No. 416—Page 214

High-Temperature Alloy

Chemical composition, physical properties and specifications of Multimet alloy (Ni, Co, Cr, Mo, W, C, Fe) for use in applications in-

For Foundrymen

volving high stresses at temperatures to 1500° F and moderate stresses to 2000° F are offered in booklet.—**Haynes Stellite Co., Division of Union Carbide Corp.,** 30-20 Thomson Ave., Long Island City 1, N. Y.

For More Details Circle No. 417—Page 214

Wood and Metal Patterns

Brochure describes facilities for production of wood, metal and plastic patterns, shell mold patterns, permanent molds and prototypes as well as nonferrous casting facilities.—**City Pattern & Foundry Co.,** 2722 West Sample St., South Bend 19, Ind.

For More Details Circle No. 418—Page 214

Castable Refractory

Super Hi-Cast, a high-temperature castable refractory for use in elevated temperatures beyond ordinary limits, is highlighted in bulletin 461.—**Denver Fire Clay Co.,** 2301 Blake St., Denver 5, Colo.

For More Details Circle No. 419—Page 214

Induction Heating

Issue 4, Inducto Metal Melting Newsletter, describes recent advances in water cooled leads for induction furnaces and points out the benefits of these innovations. —**Inductotherm Corp.,** 412 Illinois Ave., Delanco, N. J.

For More Details Circle No. 420—Page 214

Vacuum Impregnation

Booklet, "Engineering Data on Vacuum Impregnation with PE#1," provides technical information on vacuum impregnation of castings. Numerous applications are listed and procedures are outlined step by step. — **Western Sealant Co.,** 9999 West Jefferson Blvd., Culver City, Calif.

For More Details Circle No. 421—Page 214

Material Handling

Specifications, dimensions, models and capacities of lift trucks, towing tractors and platform trucks are provided in bulletin BU-450.—**Allis-Chalmers Mfg. Co.,** Buda Division, Milwaukee 1, Wis.

For More Details Circle No. 422—Page 214

Vacuum Furnaces

Construction features, advantages, dimensions and general information on standard vacuum furnaces with single or double pump vacuums are contained in bulletin 557.—**Hevi-Duty Electric Co.,** Milwaukee 1, Wis.

For More Details Circle No. 423—Page 214

RADIATION PROTECTION

Aluminized cellulose acetate face shield window for protection against radiant heat enables workers to work longer and with greater efficiency on furnace operations, melting, and metal pouring. Windows are available for all American Optical Co. face shields in the "H" series and on other types by order. Cover plates are 2 x 4¼ in. Made by **American Optical Co., Safety Products Division,** Southbridge, Mass.

For More Details Circle No. 424—Page 214

BARREL TRUCK

Barrel truck is engineered for easy handling of barrels weighing up to 1000 lb. To load, the truck is pushed against the barrel or drum and a sliding steel catch is dropped down over the rim. When handles are pulled toward the operator, the drum or barrel loads automatically without rocking or tugging. Truck is made of heavy tubing and other welded steel parts. Greatest width at any point is 22 in. Weight is 85 lb. Made by **Palmer-Shile Co.,** 16033 Fullerton, Detroit 27, Mich.

For More Details Circle No. 425—Page 214

LEVEL CONTROL DEVICE

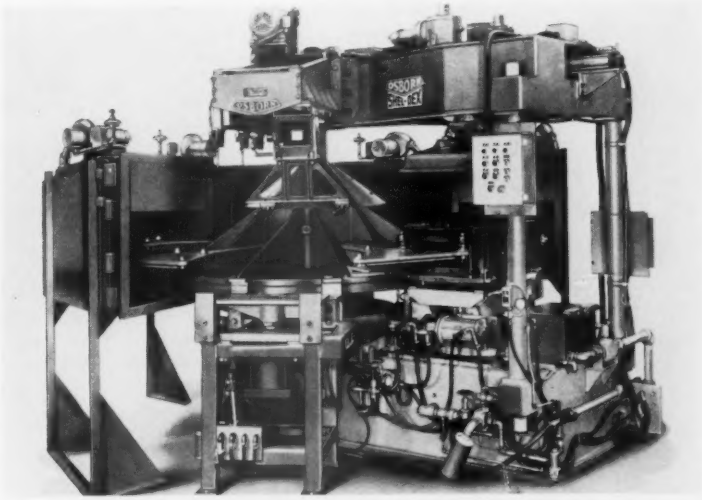
Redesigned low-torque motor and gear reduction unit and an improved mounting arrangement have been made to permit use of the Roto-Bin-Dicator bulk material level control device in more severe operating conditions. The device, available in standard or explosion-proof models, is adaptable to installations in bins under pressure or vacuum; in bins, chutes or conveyers handling materials containing large lumps which tend to bridge over a diaphragm; and in bins handling materials which tend to rat-hole and prevent operation of a diaphragm. Made by **Bin-Dicator Co.,** 107-13946 Kercheval Ave., Detroit 15, Mich.

For More Details Circle No. 426—Page 214

PRESS CONTROL

Electronic-mechanical press control to prevent tool and die damage caused by mechanical overload is designed for use on automatic equipment such as presses and molding machines equipped with solenoid or clutch-type release. The mechanism senses the slightest mechanical overload from practically any malfunction and stops

Shell Mold Unit Features Multiple Stations



MULTIPLE-STATION indexing shell molding machines are available with two, four, five, or six stations according to job requirements. Features of the Shel-Dex units are: Repetitive preset time cycles permit rapid and continuous production; air-stream blowing method for making shell molds and shell cores maintains uniform density and controlled shell thickness; productivity and efficiency are maximized by the unit's fast, accurate stripping along with shell transfer and removal features; and multiple oven stations allow controlled cure time that is adjustable to suit specific requirements. Gas-fired ovens or electrical heating elements are applicable. Made by **Osborn Mfg. Co.,** 5401 Hamilton Ave., Cleveland 14, Ohio.

For More Details Circle No. 478—Page 214

the machine. The control is automatically self-adjusting and wear compensating and is unaffected by normal factory temperature changes. Made by **Wintriss Inc.**, 20 Vandam St., New York 13, N. Y.

For More Details Circle No. 427—Page 214

VACUUM FURNACE

Model 2551-B vacuum induction furnace has a tilt pour crucible capacity of 72 cu in., giving a nominal capacity of 12 lb of molten steel. Motor generator induction power supply produces temperatures to 1700° C or higher depending on the crucible material. Pumping system maintains a pressure of one micron. In addition to melting and casting, the unit can be used for sintering, brazing, annealing, degassing, and heat treating. A space of 10 x 10 x 8 ft high is sufficient for operating and maintenance. Made by **NRC Equipment Corp., subsidiary of National Research Corp.**, 160 Charlemont St., Newton Highlands 61, Mass.

For More Details Circle No. 428—Page 214

OPTICAL STRAIN GAGE

Optical strain gage measures strains in materials at temperatures up to 1000° F. Tensions and strains as small as 0.000004 in. can be measured. Gage consists of two essential parts—the Auto-Collimator and the extensometer (gage). The strain being measured is manifested by a rocking of a mirror within the extensometer. The degree of rocking is measured by the Auto-Collimator. Any number of extensometers can be used with a single Auto-Collimator and either flat or cylindrical specimens may be tested. Made by **American Instrument Co.**, 8030 Georgia Ave., Silver Spring, Md.

For More Details Circle No. 429—Page 214

LUBRICATION FITTING

Relief-type lubrication fitting is for use on antifriction bearings in motors, machinery, pillow blocks or any ball or roller bearing housing equipped with conventional relief plugs. The fitting features a "flip-open" cap that speeds bearing lubrication. The body of the fitting is flared internally to allow free discharge of excess grease. No wrenches or special tools are needed to open the cap, which swivels to any position so that it is easy to reach. Made by **Keystone Lubricating Co.**, 3100 North 21st St., Philadelphia 32, Pa.

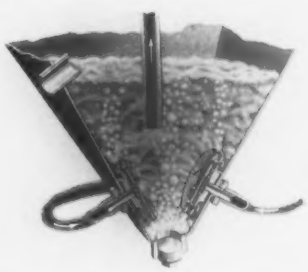
For More Details Circle No. 430—Page 214

BATTERY CELL COVERS

Newly developed material for industrial storage battery cell containers and covers virtually eliminates battery breakage. The Hi-Impac material, as it is called, has replaced standard materials in the C & D Slyver-Clad line of batteries for industrial trucks. Manufacturer claims that use of the material practically eliminates damage to battery cells from dropping, collision between trucks or from impact of heavy falling objects. Made by **C & D Batteries Inc.**, Washington & Cherry Sts., Conshohocken, Pa.

For More Details Circle No. 431—Page 214

Kit Keeps Fine Abrasives Slurried in Water



SLURIATOR KIT is engineered to keep fine abrasives thoroughly slurried in water for die and mold cleaning, deburring, maintenance cleaning and other finishing operations. The kit prevents solid packing of abrasive at the bottom of cleaning tanks after overnight shutdown. The kit consists of a 4-in.-diam compressed air distributor set between two heavy-gage alloy, circular plates. Two such fittings are installed at the base of the sloping side walls of the abrasive slurry tank so that the agitating air sweeps the tank bottom as well as spirals it through the body of the liquid to provide rapid and thorough agitation of the slurry.

For operation, the equipment requires a take-off from a regular 80 to 90 lb compressed air line (needed to operate the nozzle) and a needle valve to regulate air flow through the Sluriator head at 6 to 10 cfm. Made by **Pangborn Corp.**, 1400 Pangborn Blvd., Hagerstown, Md.

For More Details Circle No. 479—Page 214

LITERATURE

Repair Welding

Booklet, "Recommended Practice for Repair Welding and Fabrication Welding of Steel Castings," a publication of the Steel Founders' Society of America, covers methods, preparation for welding, electrodes and their classification and recommended procedures for carbon-steel and low-alloy steel castings.—**Tempil Corp.**, 132 West 22nd St., New York 11, N. Y.

For More Details Circle No. 432—Page 214

Material Handling

Bulletin 530, "Airstream Conveyors—the Automatic Answer to Bulk Handling," presents technical data, installation diagrams, applications and lists of materials which can be handled by pneumatic conveying systems.—**Dracco Corp.**, Box 1794, Cleveland 5, Ohio.

For More Details Circle No. 433—Page 214

Reciprocating Pumps

Catalog 453 presents construction details, specifications, descriptions and general information on air-powered Powerflo reciprocating pumps for handling a wide variety of liquid and semisolid materials of various viscosities.—**Gray Co.**, Minneapolis 13, Minn.

For More Details Circle No. 434—Page 214

Industrial Installations

Brochure describes and illustrates services available to industry for erecting, installing, moving or mothballing heavy equipment.—**Commercial Contracting Corp.**, 12160 Cloverdale, Detroit 4, Mich.

For More Details Circle No. 435—Page 214

Epoxy Dermatitis

Booklet cites hazards of epoxy dermatitis and lists specific and practical rules for prevention.—**Milburn Co.**, 3246 East Woodridge, Detroit 7, Mich.

For More Details Circle No. 436—Page 214

Industrial Fans

Construction, operations and specifications of fans designed for heavy industry and commercial installations are highlighted in bulletin MD 102.—**Chicago Blower Corp.**, 9863 Pacific Ave., Franklin Park, Ill.

For More Details Circle No. 437—Page 214

Engine Hour Meter

Catalog 600 details pertinent information on the functions of direct and alternating current hour meters of the pointer and direct-

USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES AND LITERATURE DESCRIBED IN THIS SECTION

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For Foundrymen

reading types that can be used on all kinds of equipment powered by internal combustion gasoline or diesel engines.—**John W. Hobbs Co., Division of Stewart-Warner Corp.,** 1826 Diversey Pkwy., Chicago 14, Ill.

For More Details Circle No. 438—Page 214

Safety Chart

Wall chart contains a series of illustrative sketches pointing out correct safety techniques for handling materials with chain blocks. Company's chain blocks and trolleys are described briefly on reverse side.—**Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division,** Muskegon, Mich.

For More Details Circle No. 439—Page 214

Industrial Tires

Guide book covers all phases of industrial tire use and provides specifications for all types of tires as well as their uses and capacities. Included are data on solid, pneumatic and semipneumatic tires and vulcanized-on wheels.—**B. F. Goodrich Tire Co.,** Akron, Ohio.

For More Details Circle No. 440—Page 214

Surface Equipment

Precision surface equipment for tooling and production operations in metalworking and welding shops are described in folder 823.—**Challenge Machinery Co.,** Grand Haven, Mich.

For More Details Circle No. 441—Page 214

Product Research

Booklet, "Product Research and Development," describes specific areas in which Franklin Institute's laboratories are staffed and equipped to perform research and development. — **Franklin Institute Laboratories,** 20th and Parkway, Philadelphia 3, Pa.

For More Details Circle No. 442—Page 214

Pneumatic Conveying

Stationary and portable pneumatic conveying systems with capacities from ¾ through 10 tons per hr are illustrated and described in bulletin 143-B.—**Spencer Turbine Co.,** Hartford 6, Conn.

For More Details Circle No. 443—Page 214

Air Blow Gun

Bulletins provide general information and descriptive data on a controlled flow air blow gun and a safety chip gun, available in several models.—**C. A. Claflin Co.,** 15 Hathaway St., Boston 10, Mass.

For More Details Circle No. 444—Page 214

INDUSTRIAL THERMOSTAT

General-purpose industrial thermostat has a temperature range up to 700°F. Copper bulbs and capillaries are supplied for applications up to 250°F, and steel bulbs and capillaries for use up to 700°F. Standard bulb diameters are 3/16 and ⅜ in. Capillary lengths are available up to 180 in. Switching mechanism of the unit is double-pole, single-throw, snap-action, normally closed or normally open, for alternating-current operation. Direct-current thermostats also are available. Made by **General Electric Co., Industrial Heating Division,** Schenectady 5, N. Y.

For More Details Circle No. 445—Page 214

ULTRASONIC TESTER

Resonant ultrasonic testing instrument measures thickness from one side as rapidly as a crystal probe is touched to the test surface. It can be used on sound-conductive materials to find thin spots in walls, eccentricity in cored castings and cast iron pipe, lack of bond, and other de-

fects. Readings are made from "pip" indications on a TV type tube face. The battery-operated unit can be carried by shoulder straps. It measures thicknesses from 0.025 to 5.0 in. Accuracy is said to be ±2 per cent. Made by **Magnaflux Corp.,** 7300 West Lawrence Ave., Chicago 31, Ill.

For More Details Circle No. 446—Page 214

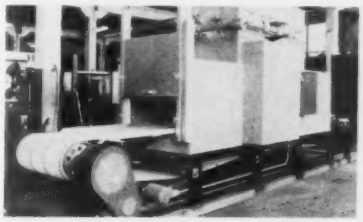
INDUSTRIAL FILTER

Dry type filter with aluminum-wool media for domestic, commercial and industrial air cleaning requirements holds dust, dirt and lint particles without the use of oils or adhesives. Rustproof, fireproof and highly resistant to chemicals or adverse atmospheric conditions, the filters are rejuvenated with a vacuum cleaner or flushing with water. Filters are available in standard or specially engineered sizes and thicknesses of ½, 1 and 2 in. Made by **Carey Electronic Engineering Co.,** 1880 Clifton Ave., Springfield 39, Ohio.

For More Details Circle No. 447—Page 214

BELT CONVEYER OVEN

Continuous belt conveyer oven carries product through the heated zone and can be arranged for both auto-

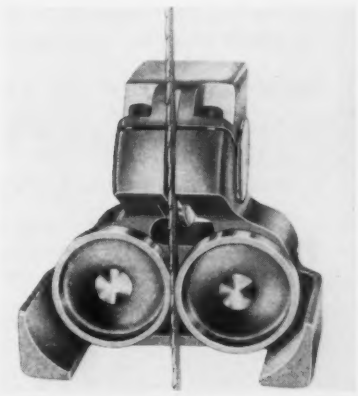


matic loading and unloading facilities. Ovens are used for drying and baking processes. Continuous belt is 36 in. wide, driven by an electric motor at an adjustable belt speed of 2 to 10 fpm. Belt is 30 in. from floor. Inside dimensions of the baking chamber of the oven are 24 in. high x 38 in. wide x 15 ft long. Over-all height of the unit is 11 ft 6 in. Ovens can be made for heating by gas, electricity, or steam. Dimensions and other specifications can be changed to suit requirements. Made by **Grieve-Hendry Co.,** 1401 West Carroll Ave., Chicago 7, Ill.

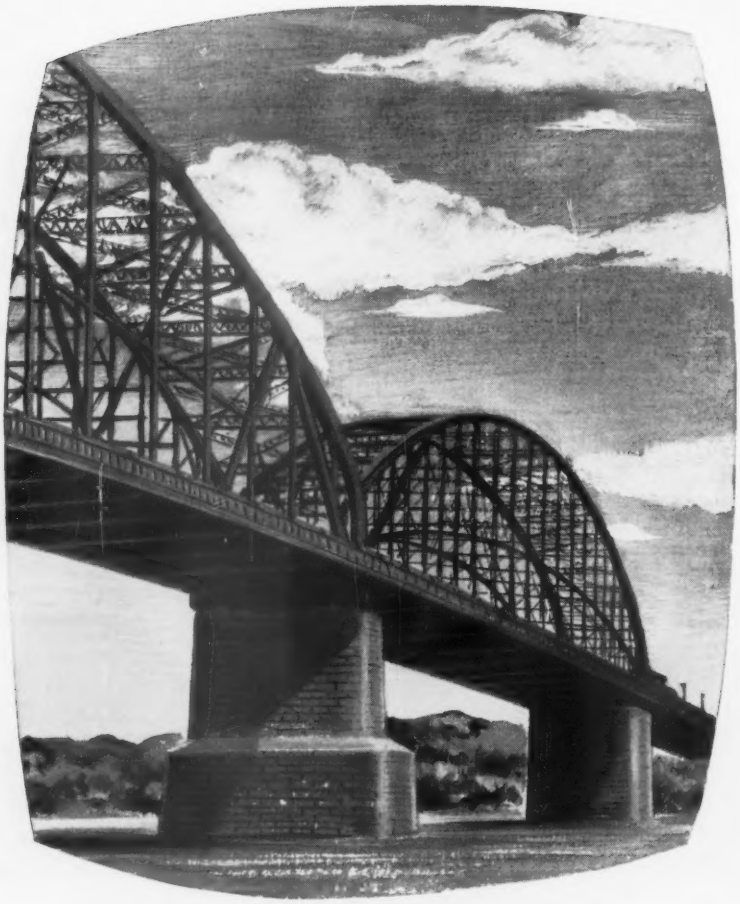
For More Details Circle No. 448—Page 214

BANDSAW GUIDE

Bandsaw guide is said to operate on saws cutting any material at any speed or load. The Carter Guidall 400 handles blade speeds up to 15,-



000 fpm and thrust loads to 175 lb at maximum speeds and to 500 lb at lower speeds. It accommodates saw blades from 3/16 to 2½ in. Edge of the saw blade rides on the outside perimeter of the thrust wheel



ONLY STEEL . . .

can provide the basic structural strength to withstand the tremendous stresses, strains, and loads of a modern "bay-spanning" bridge!

ONLY STEEL . . .

can do the job where the prerequisite quality in an abrasive calls for steel's hardness, toughness, and strength.

"TRU-STEEL" Is TRUE STEEL

The original high carbon, fully heat-treated steel shot of tool steel quality. TRU-STEEL is solid, hard, and tough — TRUE STEEL in Chemistry, Characteristics and Performance.

NOW IN 50 POUND BAGS

Write for full information on TRU-STEEL and what it can do for YOU in YOUR cleaning operation!

TRU-STEEL SHOT

STEEL SHOT PRODUCERS, INC. ®
Butler, Pa.
Subsidiary of Pittsburgh Crushed Steel Co.
Pittsburgh 1, Pa.

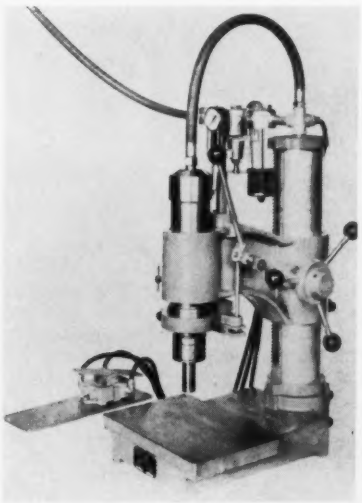
Sold by Pangborn Corporation, and by leading distributors of foundry supplies from coast to coast

and with the thrust wheel and support rollers all operating on the inner raceway of the bearing. For applications requiring a wiping action on the blade, the guide is offered with support blocks instead of rollers. Made by **Carter Products Co.**, Grand Rapids, Mich.

For More Details Circle No. 449—Page 214

REPEATING AIR HAMMER

Model 300-RH repeating air hammer features an air-traverse mechanism controlled by a foot valve to lower the impact tool onto the work and hold it there during the work



cycle. Valving is internal and actuated by this contact. As long as the contact pressure is maintained, the hammer will repeat at from 1000 to 2500 times per minute depending on air pressure. When the foot pedal is released, the hammer cylinder is lifted from the work. The tool can be used for straightening small malleable castings, staking, crimping, or impression stamping castings. It is keyed against rotation and reportedly will repeat without wandering or wobbling. Cylinder and head frame assembly may be used as a component of automatic machines and may be mounted at any angle. Made by **Heidrich-Nourse Co.**, 631 East Third St., Los Angeles 13, Calif.

For More Details Circle No. 450—Page 214

LIFTING MAGNETS

Lifting magnets, Type SB, are 57 and 66 in. in diam and designed to permit field replacement of worn pole shoes and similar do-it-yourself tasks associated with normal magnet repair. Coils are wound with strap aluminum conductor on a mica and ecamica-insulated spool. Radial

CO_2 Cures Intricate Aluminum Casting Cores

IN 15 SECONDS!

Aluminum Casting and Engineering Company of Milwaukee is one of the pioneer firms in fabricating parts of lightweight aluminum.

They manufacture a particularly intricate aluminum casting for the upper gear housing of one of America's most popular 25 h. p. outboard motors. This casting is made by using a permanent mold and a CO_2 set sand core. Formerly, the core was made in four separate sections and pieced together.

CO_2 MAKES A ONE-PIECE CORE POSSIBLE

Now, with the CO_2 set process, the core is made in one piece and cures in 15 seconds, without baking or drying. Core making with any other method would be virtually impossible because the intricate nature of the core requires great strength and complete curing *before* handling. Aluminum Casting and Engineering Company reports that they can control the strength of the cured core by the amount of CO_2 set binder mixed with the sand . . . an important control factor.

The CO_2 set core has a high quality finish when removed from the core box. This greatly cuts down the amount of hand labor required to clean-up and finish the cured core. Because the sand is extruded into the core box, there is no abrasive action and wear. This allows use of a lightweight core box made of aluminum.

CO_2 set can be used to cure sand molds and cores for every type of ferrous or non-ferrous casting. We will be glad to show you how your time and dollar investment in molds and cores can be greatly reduced. Mail the coupon for full particulars.

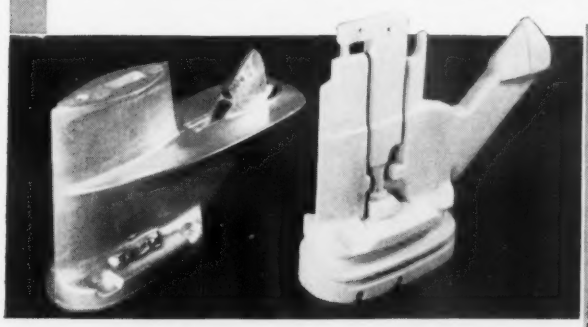
World's Largest Producer of CO_2

THE LIQUID CARBONIC CORPORATION

Chicago 23, Illinois

Core making at Aluminum Casting and Engineering Company is as well laid out as the most modern step-saver kitchen. The worker is never more than one or two steps from the core shooter that fills the core box, to the CO_2 tank and gas injector, to the work area where the cured core is removed.

This close-up of the CO_2 tank and gas injector reveals the simplicity of the operation. By the time the worker has removed the core box from the gas injector and placed it on the work area, the core is cured and ready for removal.



Here is the rough casting and the sand core side by side. Because of its dimensional stability, the CO_2 set core contributes greatly to the high quality of the aluminum casting.

THE LIQUID CARBONIC CORPORATION
3150 South Kedzie Avenue • Chicago 23, Illinois

Please send me complete information on CO_2 set for curing sand molds and cores.

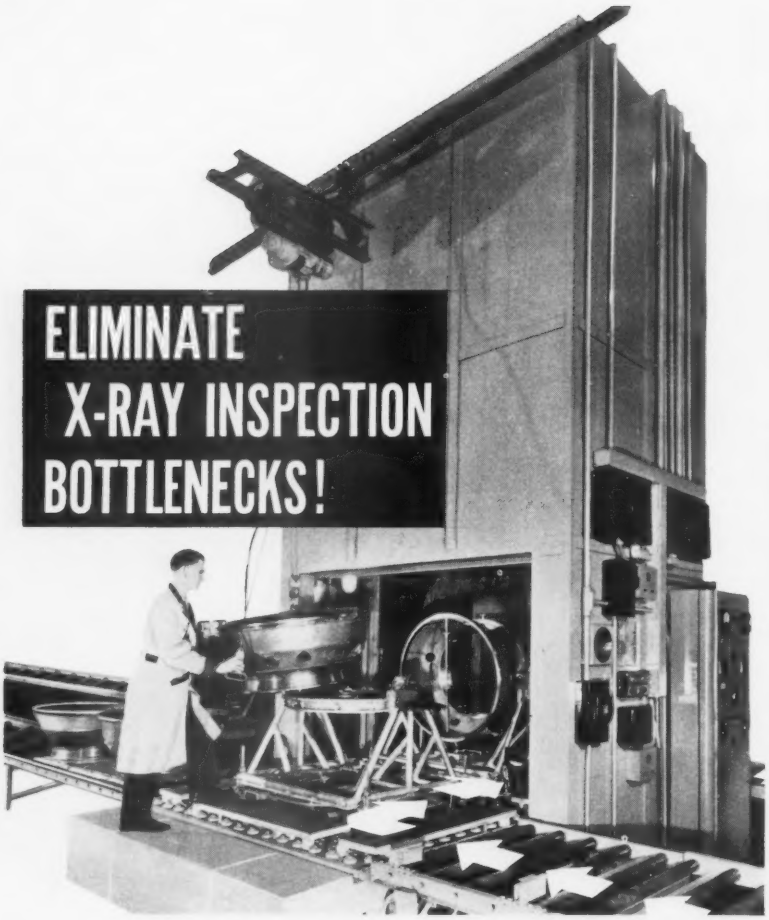
Name _____

Company _____

Address _____

City _____ Zone _____ State _____

Circle 684 on Inquiry Card—Page 51



Says GENERAL ELECTRIC..."In a RAY PROOF® cabinet one x-ray unit does the work of four"

Pick your production capacity! There's a RAY PROOF radiographic inspection cabinet to meet your **exact** requirements . . . fully automatic or manual – in giant or midget size . . . skillfully designed to perform for your **particular** need: whether for castings, multiple simultaneous parts inspection or aircraft components of any magnitude.

Typical of the "automated" units – cabinet by RAY PROOF – is the type pictured, one of the many recently installed in the plants of leading aircraft manufacturers . . . where they shield G. E. x-ray equipment. Their superior performance inspired the compliment shown above.

These combined skills are your assurance of increased production **at lower costs!**

Learn the many advantages that this combination offers you . . . write to Ray Proof Corporation, Special Services Department, Room 20, Canal Street, Stamford, Conn.

REMEMBER: RAY PROOF also manufactures—Shielded Doors—Windows—Rooms—Production Cabinets • Mechanical Production Shielding Devices • High Density Concrete Blocks • Containers • Caves • Cells • Safes • Screens • Portable Enclosures • Shielded Conveyors • Shielded Elevators and Flouroscopic Production Inspection Units

We are building **our future** ...on performance **today!**

RAY PROOF

PIONEERS IN THE CREATIVE USE OF MATERIALS FOR STRUCTURAL RADIATION SHIELDING

clamps hold the coil windings against movement on the spool. The spool is held in the magnet case by continuous beaded welds to provide a

watertight seal. Coil leads are on opposite sides of the magnet and terminate in separate chambers 180 degrees apart. Chains are of three-leg design in cast manganese steel. Made by **Square D Co., EC&M Division,** 4500 Lee Rd., Cleveland 28, Ohio.

For More Details Circle No. 451—Page 214

EQUIPMENT APPRAISER

Vinyl plastic computing device is 6 in. in diam and contains scales and formulas to aid in making fast, reliable decisions as to the length of time it will take for equipment to pay for itself. The device reported-

ly can be used in any business on any equipment. Instructions are furnished with each unit. Made by **Van D. Mark,** Box 67, Mount Clemens, Mich.

For More Details Circle No. 452—Page 214

AERATOR

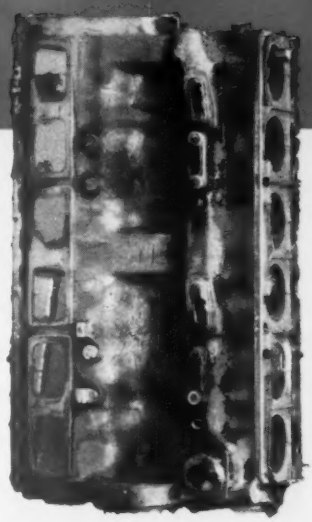
Compact aerator fits anywhere in the sand system and does not require an elevator feed. Customer's conveyor belt carries material through the unit, and design of the undercarriage and discharge baffling eliminates spillage. Units are made

WHEELABRATOR STEEL SHOT
cuts abrasive costs for all types of foundries

GOLDEN FOUNDRY COMPANY, INC., COLUMBUS, INDIANA

A PRODUCTION JOBBING GRAY IRON FOUNDRY

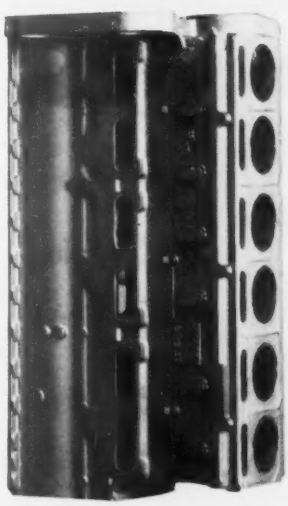
reduces abrasive consumption 45%
saves $4957.00 annually



Tests made for one year between heat treated shot and Wheelabrator Steel Shot in a 4-wheel blast machine conclusively proved to the Golden Foundry Company, Columbus, Indiana that Wheelabrator Steel Shot saved them 45% in abrasive consumption. Whereas 18 lbs. of heat treated shot were required per wheel hour, only 10 lbs. of Wheelabrator Steel Shot were consumed for the same period. The actual savings came to 28.4 cents per wheel hour, or $4,957.50 for just one machine in one year. This is based on 4,364 hours of operating time multiplied by 4 wheels for a total of 17,456 wheel hours.

Similar tests by other foundries have shown similar results — some making even more than the 45% savings registered by Golden Foundry Co.

Wheelabrator Steel Shot has brought abrasive savings and reduction in parts wear and maintenance expense to all types of foundries — steel, gray iron, malleable, non-ferrous, large, small, jobbing, production, etc. You, too, can save with this versatile steel shot.



For more information, send today for Catalog 89-B.

WHEELABRATOR
CORPORATION
505 South Byrkit Street, Mishawaka, Indiana

World's Largest Manufacturer of Steel Shot and Airless Blast Cleaning Equipment

Circle 686 on Inquiry Card—Page 51

Why STERLINGS are MAN'S BEST Materials-Handling FRIEND!

Ask about liberal dealer sales plan

1. **ALWAYS READY** to use . . . no fuel or other "operating supplies" needed.
2. **NO "STARTING"** Problems . . . regardless of cold, heat, rain, dust.
3. **NO "HOUSING"** Problems . . . no protective warehousing needed, no covering, no "babying".
4. **NO MAINTENANCE** Problems . . . nothing to get out of order . . . rugged, long-lasting.
5. **EASIEST WHEELING** . . . with choice of pneumatic, semi-pneumatic or steel-tired wheels (with plain, ball or roller bearings.) These are the easiest rolling wheelbarrows made!
6. **EASIEST** on the barrow man . . . engineered to balance 4/5ths of load on the wheel; only 1/5th of load at handle grips.
7. **EASIEST CLEANEST-DUMPING** . . . steel trays engineered to unload completely, with least effort.

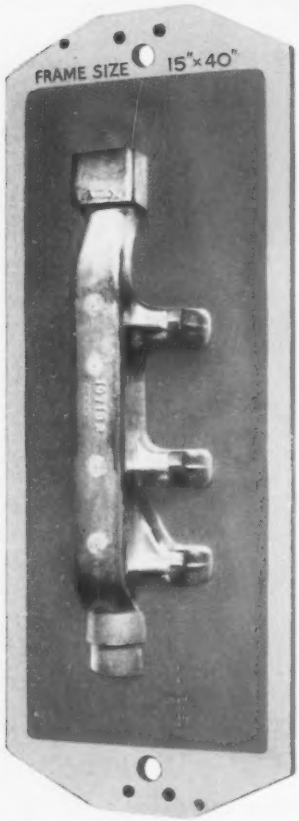
Costs Less per Year

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

Circle 687 on Inquiry Card—Page 51 A 8245-3/5



"The type of work we produce in TAMASTONE we would be unable to make at all in the absence of skilled help"

COLUMBUS BRASS & ALUMINUM CO., INC.
Columbus, Indiana

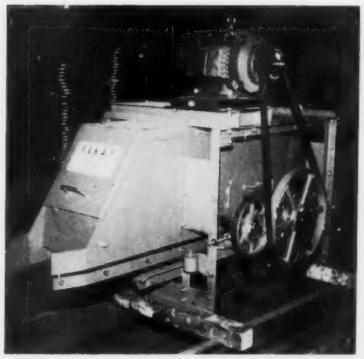
This Drier pattern for a diesel engine manifold is made from an original master pattern. *Only one shrinkage!* Material is "Ni-resist" iron. Pattern was used for 500 pieces. Only 3 hours labor and 44 pounds of TAMASTONE were required. Up to 1,000 castings have been made from a plate of this type!

No special skill needed to increase production 400% or more! . . . WRITE . . .

TAMMS INDUSTRIES CO.
228 N. LaSalle Street
Chicago 1, Illinois

Circle 688 on Inquiry Card—Page 51

with 12, 16 and 20 in. diam wheels. Largest unit has capacity up to 450 tons per hour and requires a 25-hp motor. Unit is shipped motor mounted and assembled, requiring only



placement on the conveyor frame before it is ready to operate. Made by **Pekay Machine & Engineering Co.**, 865 North Sangamon St., Chicago 22, Ill.

For More Details Circle No. 453—Page 214

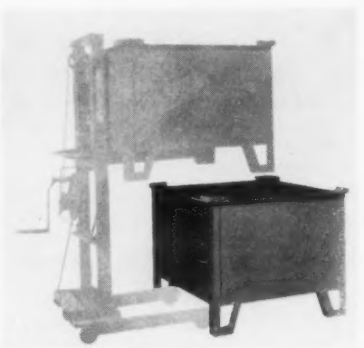
BAG CUTTER

Bag cutter for bagged refractories, cements, chemicals, etc., cleanly cuts paper sacks in half for ease of lifting and emptying. It can be used at floor level or raised to a desired height on its legs of 1 in. pipe. Blade is of hardened steel which is encased in a steel sheath when not in use. Made by **Ridley & Co.**, 11275 Massachusetts Ave., Los Angeles 25, Calif.

For More Details Circle No. 454—Page 214

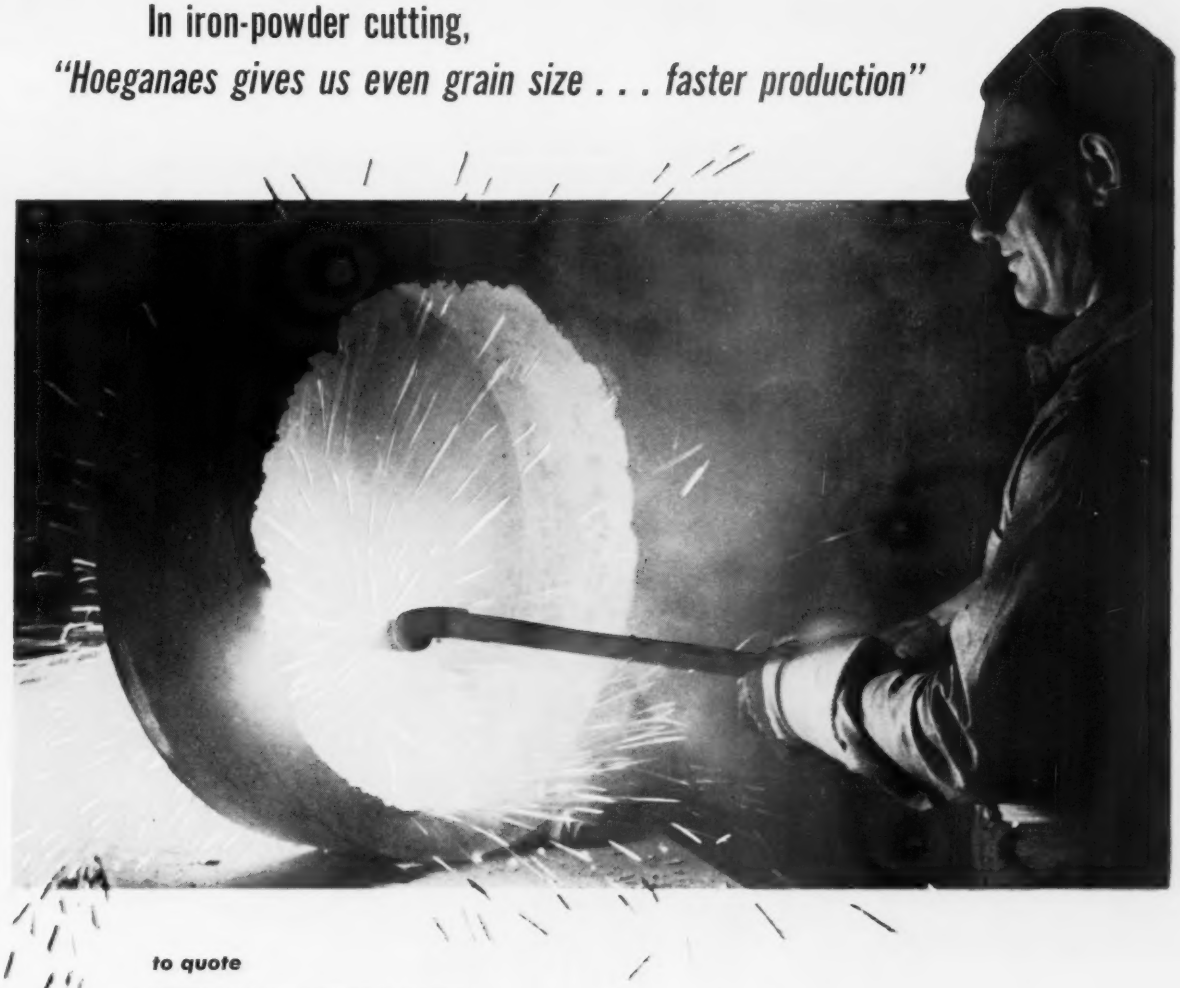
STACKING STORAGE BIN

All-steel stacking storage bin, weighing 210 lb, has four-way entrance designed for use with hand or power lift trucks or fork trucks.



Bins can be tiered with portable elevators, high lift or fork trucks. Bins can be built with crane lugs for use with overhead hoists. Units are made of heavy steel plate, with legs and corner reinforcements of angle

In iron-powder cutting,
"Hoeganaes gives us even grain size . . . faster production"



to quote

COOPER ALLOY CORPORATION

Hillside, New Jersey

—producer of stainless steel castings, pipe fittings, valves, high alloy aircraft rings, and chemical pumps.

Write now for Literature No. 105. Contains vital facts about powder metal-cutting. Better still, the Hoeganaes Specialist Engineer can give you all the facts. He's as near as your telephone.

And to further quote Cooper Alloy Corporation in detail, here are additional performance facts about Hoeganaes Ancor-Flame Sponge Iron Powder.

"Other materials had a tendency to jam in the nozzle, to clog-up and cause a great deal of maintenance and down-time.

"We have found in Hoeganaes Ancor-Flame a high degree of grain fineness and uniformity, which keep maintenance down and an even flow of the cutting material. The biggest benefit to Cooper Alloy has been this even grain size, not too large and not too small, enabling the smooth passage through the nozzle and faster production."

Hoeganaes Ancor-Flame Iron Powder introduced into the oxygen stream, oxidizes rapidly—increases flame temperature. Easily permits flame-cuts of stainless steels and oxidation-resistant metals.

HSIC

HOEGANAES

HOEGANAES SPONGE IRON CORPORATION

RIVERTON, NEW JERSEY

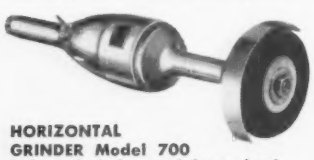
SALES REPRESENTATIVES IN PRINCIPAL CITIES: Birmingham, Chicago, Cincinnati, Cleveland (Fostoria), Edmonton (Alberta, Canada), Los Angeles, Minneapolis, New England (Elmira, N.Y.), Philadelphia (Riverton, N. J.), Pittsburgh, San Francisco, St. Louis

CUT GRINDING TIME AND COSTS...

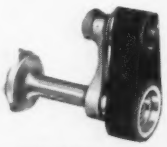
NEW!

VERTICAL GRINDER Model 700-V

Designed for easier flat or curved surface grinding, sanding, and wire brushing. Packs plenty of power . . . adjustable speed to 6000 R.P.M. Two handles for convenience in maneuvering . . . safe control. Weighs only 11 lbs. 6" cup wheel or brush, 7" or 9" sanding disc.



HORIZONTAL GRINDER Model 700
Balanced design and long shank for grinding or snagging around intricate construction. Controlled speeds up to 6000 RPM. Lightweight (only 12 lbs. without wheel) reduces operator fatigue. Models for 6" or 8" grinding wheel.



ABRASIVE BELT ATTACHMENT
For fine finishing on dies, molds seams, contour surfaces. Attaches easily to Models 600 and 700, uses 2" wide belt.

Designed for maximum portability . . . built for rugged continuous service. Airetool's "Power Seal" air motor is economical to operate and maintain . . . delivers ample power and even speed. It won't stall under severe loads or heat up from constant use.

Grinder housings cast from special aluminum alloy for extra strength and lightness.

For complete information on how Airetool grinders can cut your grinding costs, contact your Airetool representative or write for literature.

AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

BRANCH OFFICES: New York Chicago Tulsa Philadelphia Houston Baton Rouge

REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, England, Europe, Italy, Japan, Hawaii
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario

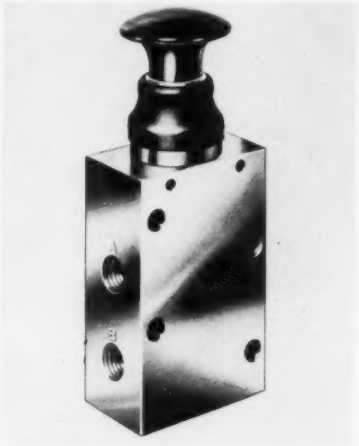
powerful...
light-weight...
air-powered...
AIRETOOL GRINDERS

iron. Inside dimensions are length 36 in., width 36 in., and depth 24 in. Made by **Palmer-Shile Co.**, 1603 Fullerton, Detroit 27, Mich.

For More Details Circle No. 455—Page 214

AIR CONTROL VALVE

Flo-Pilot series of air control valves features a small synthetic rubber boot which snaps in place around the valve stem, sealing all critical areas from dirt and abrasives and extending valve life. Basic valve



has five optional actuating heads—palm button, ball cam, lever, locking lever and mechanical link clevis. These heads are interchangeable in a few seconds. Any of the valves can be base, panel or wall mounted. Same valve can be used as either a two-way or a three-way valve and can be normally open or normally closed to inlet pressure, depending on the piping arrangement. Pipe ports are ¼-in. Valve is built for 150 psi air operation. Made by **Hanna Engineering Works**, 765 Elston Ave., Chicago 22, Ill.

For More Details Circle No. 456—Page 214

AIR COMPRESSOR

ADL-1000 air compressor is a two-stage, 20-hp, two-cylinder vertical compressor with a piston displacement of 100 cfm at 870 rpm in continuous service. Discharge pressure is up to 150 psi. On intermittent service, discharge pressure is as high as 250 psi. Made by **Gardner-Denver Co.**, Quincy, Ill.

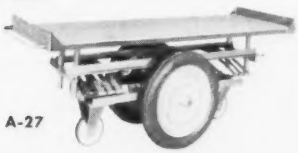
For More Details Circle No. 457—Page 214

DRUM DiSPENSER

Model 76E drum dispenser provides transportation to point of use and direct-from-drum electrical pumping of lubricating oil, coolant, solvent, or chemicals. Drums of up

A COMPLETE LINE OF CORE HANDLING EQUIPMENT

MODEL C 1



MODEL A-27

You can count on CMD for the finest in core handling and allied foundry equipment. Our core trucks, barrows and racks are built to handle and transfer cores safely and easily. The secret is CMD's exclusive resiliency—a resiliency caused by coil, leaf spring and pneumatic cushioning—the smoothest core ride in the industry.

Look to CMD for superior quality, longer life, less maintenance in foundry products.

- CORE BARROWS
- CORE TRUCKS
- RESILIENT CORE RACKS
- WOODEN FLASKS
- WOODEN BOTTOM BOARDS
- BAG HOLDING TRUCKS
- CHIPPING HAMMERS
- SKIMMERS • WOOD WEDGES
- SLIP JACKETS

Send for complete information on CMD Foundry Products

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1920 W. 46th St., Chicago 9, Illinois

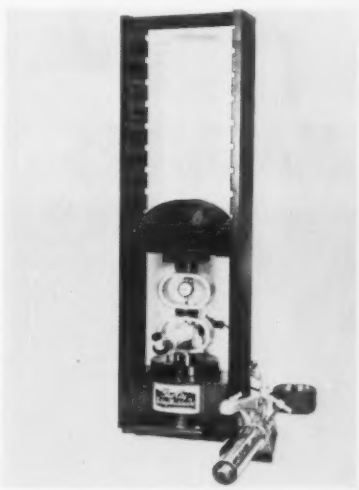
Circle 691 on Inquiry Card—Page 51

to 1000 lb are clamped by chime in positive locking vise and raised hydraulically in upright position for carrying. Open-top drums of liquid may be carried without spillage. Specifications include ½-hp electric motor mounted beneath handle, two 12-in., heavy-duty wheels and one 8-in. caster, 15-gpm pump, neoprene dispensing hose with trigger type nozzle and neoprene barrel hose. Clamp is adjustable for all drums and chime thicknesses. Made by **Coolant Equipment Corp.**, Verona, Wis.

For More Details Circle No. 458—Page 214

COMPRESSION TESTER

Compact, portable compression tester is hydraulically operated and suitable for laboratory as well as field compression testing. Capacity of the unit is 150,000 lb. Compressive force is provided by a hand-operated pump which contains its own oil reservoir. Many different types of work reportedly can be accomplished on this simple piece of equipment to avoid tying up universal testing machines and elaborate fix-



turing. Over-all height of Model TP-121 is 46 in., width is 20 in., and depth of unit with pump in operating position is 30 in. Made by **Steel City Testing Machines Inc.**, 8817 Lyndon Ave., Detroit 38, Mich.

For More Details Circle No. 459—Page 214

FIRE EXTINGUISHERS

Two pressurized dry chemical portable fire extinguishers have 20 and 30 lb capacities. To operate, the discharge horn is aimed at the blaze and the trigger is pulled. There is no trigger locking pin to remove, no valve to turn, no inverting and no bumping. To guard against accidental discharge, an automatic-op-

Three good reasons
1 Higher Quality
2 Longer Wearing
3 Greater Economy
Even the toughest impact cleaning or peening jobs can be handled with BLASTRITE . . . a product of the Abrasive Shot and Grit Co., Inc.

Write for our new catalog today!

ABRASIVE SHOT and GRIT CO., INC.
Springville, New York
Telephone: Springville 1

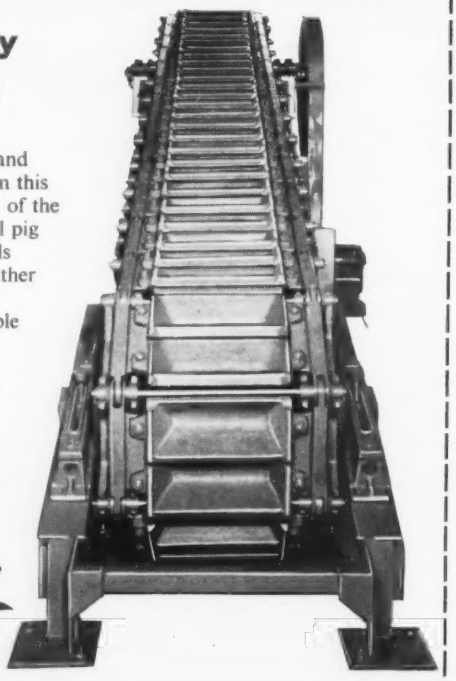
Circle 692 on Inquiry Card—Page 51

CONTINUOUS OPERATION

For Foundry Pig Casting

Sharply reduced down-time and maintenance costs result from this design which eliminates 80% of the moving parts of conventional pig casting machines. Idler wheels are mounted on the frame rather than on the moulds, thus keeping them as far as possible from the hot metal.

Bailey Pig Casting Machines are made in capacities from 3 to 50 tons per hour. Sizes: 15 to 125 feet, in multiples of 5 feet.



Bailey

PIG CASTING MACHINES

erating trigger locking pin is incorporated in the design of the discharge horn clamp. As long as the discharge horn is held by this clip,

a small plunger remains depressed, securely locking the discharge trigger. Made by **Walter Kidde & Co.**, Belleville, N. J.

For More Details Circle No. 460—Page 214

DUST FILTER

AC reverse jet dust filter is furnished with both the drive and discharge ends of the filter preassembled and welded before shipment to reduce installation time, maintenance and inspection. Filters are available in sizes ranging from 500 to 25,000 cfm air handling capacities or in multiple groupings for larger requirements. Made by **Day Sales Co.**, 810 Third Ave., N.E., Minneapolis 13, Minn.

For More Details Circle No. 461—Page 214

ELECTRIC LIFT TRUCK

Electric lift truck in 1000, 2000 and 3000 lb capacities measures 60 in. in length and has a minimum turning radius of 52 in. Adjustable pallet fork has a tilt range of ten degrees rear to three degrees for-

ward. Mast heights from a minimum of 60 in. to a maximum as desired can be provided. Special attachments include hydraulic side shifting fork, boom crane, fork extension and overhead guard. Lift

BIN STUCK LATELY?

There are two ways to handle a stuck bin. You can bang it loose with a sledge hammer and damage your equipment; or you can install Cleveland Vibrators and put an end to your problem. The first way is slow and costly. But the second way is efficient, fast, and inexpensive.

How about you! Are your schedules suffering from stuck bins? The low cost of Cleveland Vibrators will surprise you, and the results will definitely please you. Why not get the whole story with a two-cent post card.

Air or Electric
Portable or Permanent
Silent or Standard

2788 Clinton Avenue • Cleveland 13, Ohio

Circle 694 on Inquiry Card—Page 51

and directional controls are located on the steering column. Power is from 24-v lead-acid batteries. Made by **Hustler Corp.**, Elm Rd., Willoughby, Ohio.

For More Details Circle No. 462—Page 214

RUBBER CONTACT WHEELS

Rubber contact wheels have tire-flanged total disc assembly on steel with welded construction. Wheels are available in many sizes in plain or serrated faces in all hardnesses for use with all types of abrasive belts. Wheels are made of oil-resistant rubber and are designed for use in a wide variety of finishing operations. Made by **Chicago Rubber Co.**, 651 Market St., Waukegan, Ill.

For More Details Circle No. 463—Page 214

FORK TRUCK UPRIGHT

Three-section, telescoping fork truck upright raises to permit ceiling-high stacking and retracts low enough to pass through boxcar doors. Four standard sizes and seven optional sizes are available. In the smallest size, the maximum fork height is 126 in. When forks are lowered, the over-all height is only 65 in. In the largest upright size, maximum fork height is 216 in. and over-all height with forks lowered is 96 in. The upright is available on three models of Clarklift fork trucks—C 30 (3000 lb capacity), C 40 (4000 lbs) and C 50 (5000 lb). Made by **Clark Equipment Co., Industrial Truck Division**, Battle Creek, Mich.

For More Details Circle No. 464—Page 214

BLEEDER VALVES

Bleeder valves have applications on hydraulic pumps and cylinders and on oil burner fuel units as a quick air vent or as a purge plug. Made of brass with a needle-type alloy socket screw for use with a "hex"

GENERAL REFRACTORIES

A COMPLETE REFRACTORIES SERVICE... *for the Foundry Industry*

BRIKRAM 80

A high alumina ramming mix, is giving outstanding service in many foundry furnace applications.

BRIKRAM 80 when rammed in place behind rigid forms, forms an excellent refractory lining wherein temperature and resistance to strong flux or slags are desired.

BRIKRAM 80 is used to construct the lower side walls and bottoms of aluminum melting and holding furnaces, center sections of electric furnace roofs and side walls and bottoms of malleable iron furnaces.

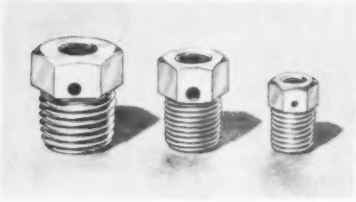
BRIKRAM 80, because of its high alumina content, is recommended for use in desulphurizing units where soda ash and other potent fluxes are used. Ladle life can also be increased by using BRIKRAM 80 in the places where the severe wear occurs. In case of ladles holding high temperature stainless steel, or other metals, long service is given by BRIKRAM 80.

For abrasion conditions, HIGH STRENGTH BRIKRAM 80 is available. This material takes a very hard air set and maintains it up to the softening point of the material.

Consult your local GREFCO representative for more complete details of these, and other GREFCO, products.

GENERAL REFRACTORIES CO.
Philadelphia 2, Pa.

Circle 695 on Inquiry Card

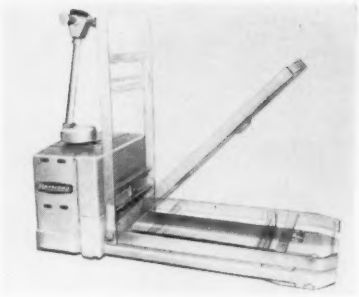


wrench, the bleeder valves are available in 1/16, ⅛ and ¼-in. dry seal pipe thread. Made by **Hydrovalve Co.**, Brooklyn 3, N. Y.

For More Details Circle No. 465—Page 214

SKID ADAPTER

Skid adapter for use with Raymond's 24-v electric walkie truck allows it to handle both skids and pallets with loads up to 4000 lb. When the truck is moving pallets, the steel frame of the adapter is locked in an upright position. To handle skids, the operator releases the lock, letting the skid adapter swing down into position over the forks. Adapters are made to handle skids of any standard underclearance and have the same dimensions as the forks, which are offered in 24, 27 and 30 in. widths and 30 and 60 in. lengths. Made by **Raymond Corp.**, 63-153 Madison Ave., Greene, N. Y.



For More Details Circle No. 466—Page 214

Most every Foundryman . . . .

Nearly all foundrymen today realize the need for keeping close check on their metal temperatures. And nearly all use Marshall Enclosed-Tip Thermocouples to make certain their metals are poured when temperatures are just right.

Marshall Thermocouples in the foundry are handy and dependable instruments. They measure temperatures of molten brass, bronze, aluminum and magnesium without trouble or delay. They are easy to use, and withstand repeated immersions. You can have them in types for furnace or ladle use.

Write for descriptive literature to: L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

Photo City Pattern Foundry & Mach. Co.

GAS REGULATOR

K-G Jeep gas-flow regulator is designed for medium to light duty service. For use with most compressed gases, it reportedly fills a need for a small but rugged regulator that can maintain constant delivery of gas with minimum maintenance. All internal working parts, including the filter, are stainless steel. High pressure gages are graduated to 4000 psig, adding a 1000 lb safety factor. Seats, pins, stems, springs, "O" rings and back caps are interchangeable with K-G 1200 Series regulators. Made by **K-G Equipment Co.**, Box 512, Allentown, Pa.

For More Details Circle No. 467—Page 214

FLEXIBLE SAFETY GOGGLES

Flexible safety goggles are made of vinyl with a cellulose acetate replaceable lens to provide impact protection and maximum vision. The goggles have a wide frame to fit over personal glasses. A lens-retaining channel runs completely around the frame and the lens itself has six opposing tabs to hold it within the channel during use. Lens and frame

Rx

for longer pattern life . . .

SCIENTIFIC MATCH PLATES
Pressure Cast

Eliminate expensive duplicate master patterns! We cast precision aluminum duplicates in one compact mold. Plates are poured under pressure to assure filling all detail. Molding is done in plaster for extreme accuracy. Write for FREE bulletin.

The
SCIENTIFIC
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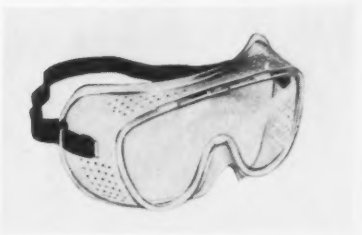
1390 E. 40th St., Cleveland 3, O.
2520 W. Lake St., Chicago 12, Ill.

Circle 697 on Inquiry Card—Page 51

are supplied in clear or green plastic or can be mixed. Model 810 is the perforated ventilation style. Model 811 offers screen ventilators and



Model 812 has indirect air vents. Made by **Sellstrom Mfg. Co.**, Palatine, Ill.

For More Details Circle No. 468—Page 214

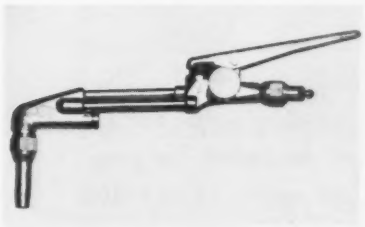
SNOW MELTING COMPOUND

Ice and snow melting compound pellets virtually are free of moisture and impurities to increase the material's thawing capacity and eliminate the formation of residue on steps, walks, driveways and loading docks. A phosphate-type rust inhibitor protects metal from deterioration. Made by **Chem Industrial Co.**, 3784 Ridge Rd., Brooklyn 9, Ohio.

For More Details Circle No. 469—Page 214

CUTTING ATTACHMENT

Light-duty oxyacetylene cutting attachment attaches to Airco style 400 welding torch. The attachment weighs 13 oz and is 9½ in. long. It can cut up to 1-in. thick steel. A diaphragm-type cutting oxygen valve eliminates valve packing and prevents gas leakage. Gas-tight seal is



assured with tapered sealing rings and hand tightening provides a firm joint. Made by **Air Reduction Sales Co.**, a division of Air Reduction Co., 150 East 42nd St., New York 17, New York.

For More Details Circle No. 470—Page 214

ELECTRIC GENERATOR

Model 7.5CM11, 7500-w, dc, air-cooled electric plant provides ample capacity for 39 and 45 in. electric magnets. The generator is a 7.5-kw, 230-v dc, four-pole unit with compound winding. Operational pow-

TAYLOR & BOGGIS
USES 18% LESS SAND
SAVES LABOR WITH...

Cleveland
FLAT COIL
CHAPLETS

Note clean chaplet breakoff on end bell hub which reduces cleaning operations.

Due to their low cost, Taylor & Boggis also uses flat coil chaplets for soldiers in deep green sand core pockets.

Only 1/2" to 1" of sand cover is required in the cope for firm support of these end bell core chaplets. Flasks are lighter and 18% less sand is handled on the end bell mold line.

In addition to providing positive core support, Cleveland Flat Coil Chaplets speed molding at Taylor & Boggis due to uniform stems and plating thickness. Check today for details on flat coil chaplet advantages in your molding lines.

Write today for *sample* and catalog!

Cleveland *Since 1890*
CHAPLET & MFG. CO.
26471 LAKELAND CLEVELAND 32, OHIO

Circle 698 on Inquiry Card—Page 51

SAVE

WITH *Acme*

MELTING POTS
INGOT MOLDS

Designed by
FOUNDRYMEN...
for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.

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er is supplied by a short-stroke, air-cooled, 4-cycle engine developing 20 hp at a governed speed of 2400 rpm. The plant features pushbutton start-

ing. Compact design permits installation on cranes of all sizes. Made by **Kohler Co.**, Kohler, Wis.

For More Details Circle No. 471—Page 214

AIR LINE FILTERS

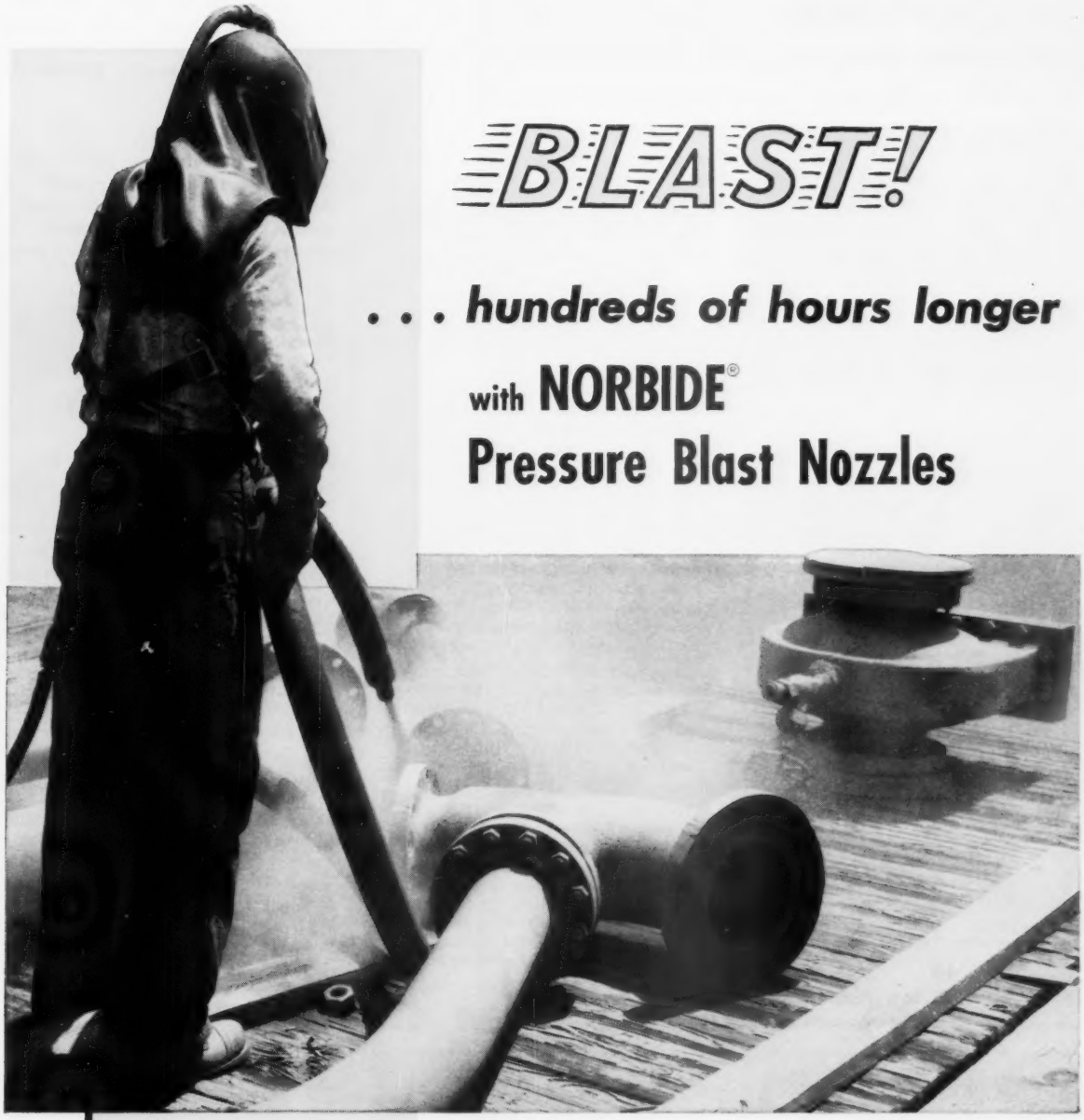
Automatic-drain, air line filters operate continually as long as there is pressure on the air system. The float-controlled, pilot-operated drain mechanism discharges only when collected liquid reaches full capacity. Twenty-four models are available that will operate at air line pressures as low as 5 psi and as high as 150 psi for transparent bowl models and 250 psi for metal bowl types. For removing abrasive solids from the air, three interchangeable filter elements can be supplied—74, 64 and 25 micron. Made by **C. A. Norgren Co.**, 3400 South Elati St., Englewood, Colo.

For More Details Circle No. 472—Page 214

PHASE CONVERTER

Converter changes single phase, 115 v, 60 cycle ac to three-phase, 230 v, 60 cycle current. Frequency is held constant within a fraction of a

cycle. Aluminum alloy frame houses capacitator starter as well as both output and input receptacles. Unit weighs 3 lb. Intake and exhaust air vents are located in lower halves of end bells. making the converter drip-proof. Converter illustrated is rated



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. . . hundreds of hours longer with NORBIDE® Pressure Blast Nozzles

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NORBIDE Pressure Blast Nozzles outwear any other type . . . 750 hours using silica sand . . . 1500 hours using steel shot or grit . . . air consumption decreased from 10 to 20 percent . . . stream contour and abrasive velocity maintained. For you, this means more service per dollar. For full details on cost-cutting NORBIDE Nozzles, write for your free copy of Form 543.

NORTON COMPANY
43 New Bond St., Worcester 6, Mass.

NORBIDE . . . *The Longest Nozzle Life You Can Buy*

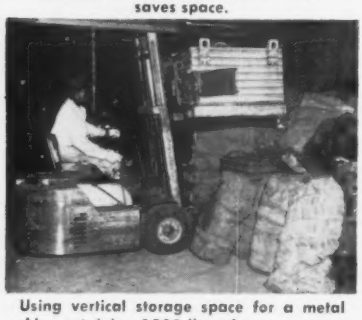
Circle 700 on Inquiry Card—Page 51

SMELTER EFFECTS 91% MAN-HOUR SAVINGS UNLOADING SCRAP USING HYSTER LOAD-GRAB® CLAMP

Feeding a 600 lb. bale of copper shavings to a furnace.

Double decking drums filled with 2000 lbs. of brass ingots.

Stacking bales of yellow brass scrap saves space.



Using vertical storage space for a metal skip containing 1500 lbs. of scrap copper.

CHICAGO, ILLINOIS — Elesco Smelting Company has effected sizable cost reductions in their materials handling procedures by use of Hyster Lift Trucks and Load-Grab attachments. Where by former methods three men worked 8 hours (24 man-hours) to unload a car of scrap, now the lift truck and driver do the same job in 2 hours (2 man-hours) ... a saving of 22 man-hours (or 91%).

Loading a trailer with ingots formerly required 3 men working 2 hours (6 man-hours); now the same men, using a Hyster Lift Truck get the same work done in 30 minutes (1½ man-hours) ... a saving of 4½ man-hours (or 75%).

Both the 2000-lb. and 4000-lb. pneumatic tire Hyster Lift Trucks are kept busy throughout the day on all types of handling jobs. At night, when the furnaces are charged, both lift trucks are kept busy hauling scrap to the furnaces.

Other Hyster® Lift Truck procedures: unloading ferrous scrap metals, storing containers, feeding bales to furnaces, emptying slag pots, loading trucks with finished ingots.

Company officers state that considerable overall savings are achieved by Hyster methods as a result of better utilization of labor, time and space. Your Hyster Dealer makes it his business to keep up with materials handling progress in smelters and foundries. Call him today. He will help you to analyze and increase efficiency of your handling procedures.

Dumping a 4000 lb. slag pot.

Call your Hyster Dealer today. He is listed in your telephone directory under "Trucks-Industrial"

HYSTER COMPANY

Hyster Industrial Trucks Increase Profits for Foundries

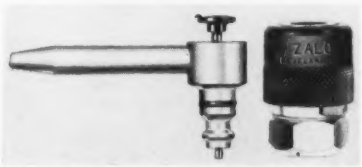
2902-30 N. E. Clackamas . . Portland 8, Oregon
1010-30 Myers Street . . . . . Danville, Illinois
Hyster N.V. . . . . Nijmegen, The Netherlands
FACTORIES: Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands

at 500 w. Other models and sizes are being developed. Made by **Kato Engineering Co.**, Mankato, Minn.

For More Details Circle No. 473—Page 214

AIR BLOW GUN

Lightweight air blow gun is made of machined steel components of simplified design and eliminates springs, valves and rubber seals. (A rubber "O" ring, which has no seal-



ing function, is the only rubber part.) Two models are made, Series 254 and 255, to fit many existing air line connections. The gun will fit Zalo 250, 255 and PT couplers. Made by **Zalo Mfg. Co.**, 4893 Van Epps Rd., Cleveland 9, Ohio.

For More Details Circle No. 474—Page 214

MERCURY LAMPS

Four 1000-w mercury lamps, listed as H1000-AW12, AW15, RW12, and RW15, have a life of 6000 hr and are designed for use in areas where higher than usual mounting is necessary. The lamps feature a phosphor internal coating which reportedly converts ultraviolet radiation into more white light than previously possible. Made by **Large Lamp Dept., General Electric Co.**, Nela Park, Cleveland 12, Ohio.

For More Details Circle No. 475—Page 214

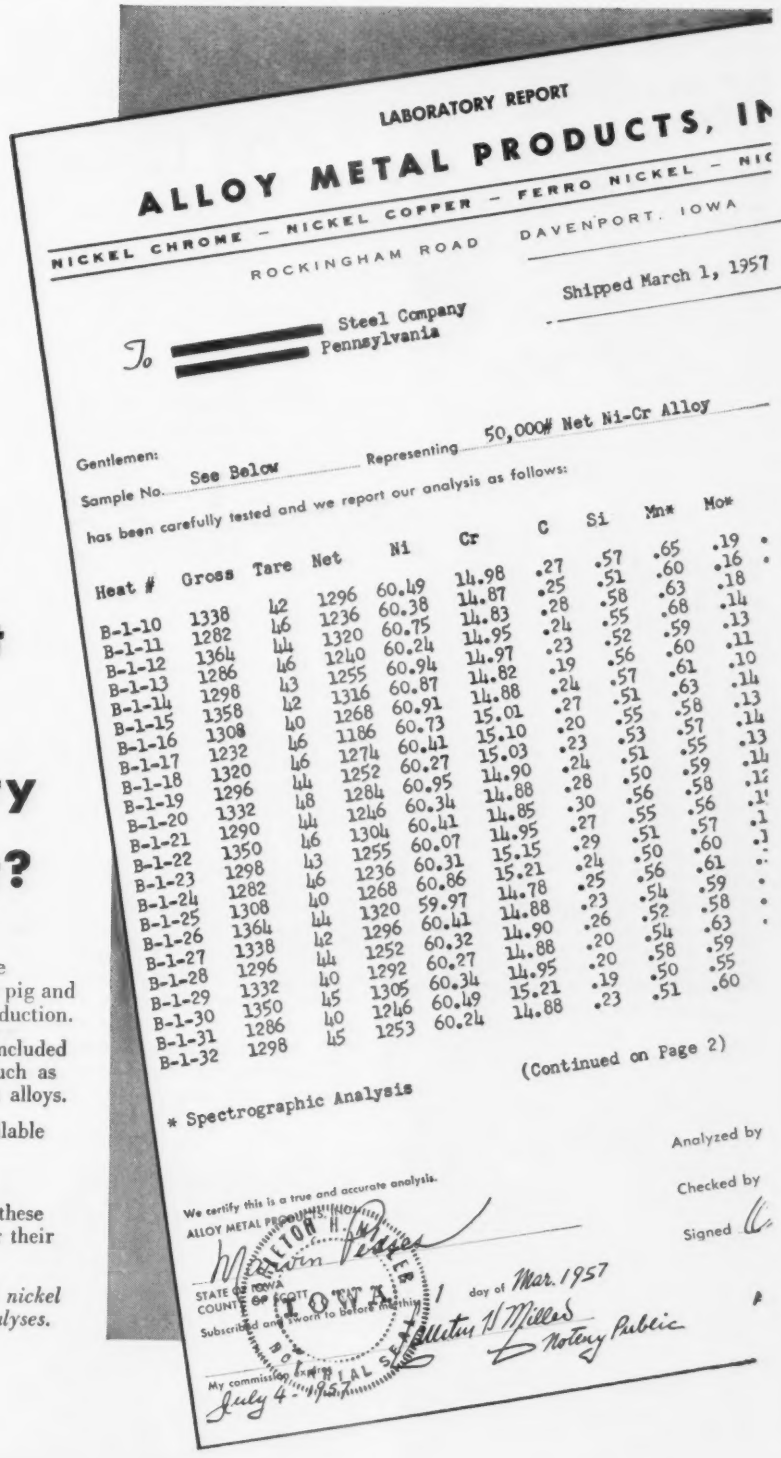
SHAFT-MOUNTED DRIVE

Steel-shaft-mounted drive is available in single reduction ratio of 5:1 and in two double reduction ratios of 14:1 or 25:1. Unit ratings range from 2 hp at 5 rpm to 50 hp at 359 rpm. Maximum torque rating at low speed shaft is 31,000 lb-in. An automotive type dip stick is provided for quick check of oil level. Made by **Falk Corp.**, Dept. 255, 3001 West Canal St., Milwaukee 1, Wis.

For More Details Circle No. 476—Page 214

CEMENT GUN TRADE MARK

A gun for the application of granular materials, manufactured by Ridley & Co., Los Angeles, and described in the September issue, was referred to as a "refractory and cement gun." Cement Gun Co., Allentown, Pa., points out that "Cement Gun" is its registered trademark.



LABORATORY REPORT

ALLOY METAL PRODUCTS, IN

NICKEL CHROME – NICKEL COPPER – FERRO NICKEL – NIC

ROCKINGHAM ROAD DAVENPORT, IOWA

To [redacted] Steel Company
Pennsylvania

Shipped March 1, 1957

Gentlemen:

Sample No. See Below Representing 50,000# Net Ni-Cr Alloy

has been carefully tested and we report our analysis as follows:

Heat #	Gross	Tare	Net	Ni	Cr	C	Si	Mn*	Mo*	
B-1-10	1338	42	1296	60.49	14.98	.27	.57	.65	.19	•
B-1-11	1282	46	1236	60.38	14.87	.25	.51	.60	.16	•
B-1-12	1364	44	1320	60.75	14.83	.28	.58	.63	.18	
B-1-13	1286	46	1240	60.24	14.95	.24	.55	.68	.14	
B-1-14	1298	43	1255	60.94	14.97	.23	.52	.59	.13	
B-1-15	1358	42	1316	60.87	14.82	.19	.56	.60	.11	
B-1-16	1308	40	1268	60.91	14.88	.24	.57	.61	.10	
B-1-17	1232	46	1186	60.73	15.01	.27	.51	.63	.14	
B-1-18	1320	46	1274	60.41	15.10	.20	.55	.58	.13	
B-1-19	1296	44	1252	60.27	15.03	.23	.53	.57	.14	
B-1-20	1332	48	1284	60.95	14.90	.24	.51	.55	.13	
B-1-21	1290	44	1246	60.34	14.88	.28	.50	.59	.14	
B-1-22	1350	46	1304	60.41	14.85	.30	.56	.58	.12	
B-1-23	1298	43	1255	60.07	14.95	.27	.55	.56	.1	
B-1-24	1282	46	1236	60.31	15.15	.29	.51	.57	.1	
B-1-25	1308	40	1268	60.86	15.21	.24	.50	.60	.1	
B-1-26	1364	44	1320	59.97	14.78	.25	.56	.61	.:	
B-1-27	1338	42	1296	60.41	14.88	.23	.54	.59	•	
B-1-28	1296	44	1252	60.32	14.90	.26	.52	.58	•	
B-1-29	1332	40	1292	60.27	14.88	.20	.54	.63	•	
B-1-30	1350	45	1305	60.34	14.95	.20	.58	.59		
B-1-31	1286	40	1246	60.49	15.21	.19	.50	.55		
B-1-32	1298	45	1253	60.24	14.88	.23	.51	.60		

(Continued on Page 2)

* Spectrographic Analysis

Analyzed by

Checked by

Signed

We certify this is a true and accurate analysis.
ALLOY METAL PRODUCTS, INC.

STATE OF IOWA
COUNTY OF SCOTT

Subscribed and sworn to before me this 1 day of Mar. 1957

Notary Public

My commission expires July 4, 1957

Our business is staked on it

. . . will you try one heat on it?

THIS IS OUR LABORATORY REPORT on one customer's order for Alloymet nickel base pig and shot* for stainless steel and alloy iron production.

It gives a complete analysis of *each heat* included in the total order. A notarized report such as this travels with every order of Alloymet alloys.

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World's largest producer of secondary nickel alloys of certified analysis

Patternmaker polishes bronze bust of Joe Roughneck cast in mold made from his pattern

Eight plaster pattern sections were employed in producing the sodium-silicate-bonded mold

Each mold section was hardened separately with CO_2 before removal from the pattern section

Casts Bronze Statue in

CO_2 Processed Zircon Sand

LAST spring, the Lone Star Steel Co., Lone Star, Tex., produced its millionth ton of steel pipe. It also established a scholarship for east Texas youths. To commemorate these events, to recognize the men of vision and courage who found oil in east Texas, and to project today's philosophy into the future, the company erected a monument in Pioneer Park near Henderson, Tex. The monument includes a time capsule which is to remain sealed for 100 years.

The capsule, a portion of the millionth ton of pipe, contains an agreement specifying that 100 shares of Lone Star stock are to be used to further education among east Texas youths 100 years from now. It also contains letters from many of today's leaders, including President Eisenhower.

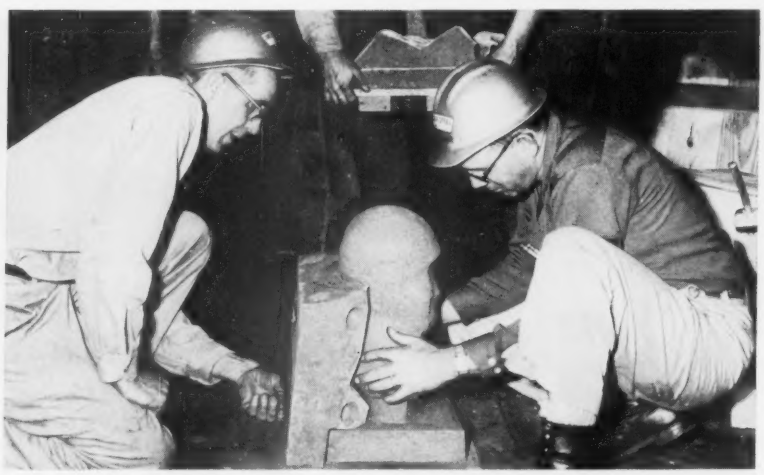
Standing guard over the time capsule is a bronze bust of Joe Roughneck, a fictional character who is symbolic of all the oil men who have worked on a derrick floor. The bust was cast in the Lone Star brass foundry by men with no experience in the art of casting statuary.

First step was to have a plastic model made by a Dallas sculptor. Then, by the trial and error method, the decision was made as to where to divide the pattern into sections which could be assembled easily to form a tight-fitting mold that would reproduce the sculptured features of fictional Joe Roughneck. The decision finally reached was that the pattern should be made in eight sections. Six formed the outside of the bust, and two formed the core for the interior. Since this was to be a one-of-a-kind job, the pattern was made of plaster. More than 1000 lb of plaster and considerable excelsior filler were used to make the complete pattern.

The mold consisted of eight sections rammed with sodium-silicate-bonded zircon sand. After being hardened with CO_2, they were removed from the patterns and assembled. The assembly was placed in a flask and backed with green sand.

Approximately 100 lb of manganese bronze was poured into the mold. When the casting was shaken out, it was scrubbed with a steel brush while still hot. After final cleaning and finishing, Joe, who then weighed 64 lb, was mounted on the monument to begin his 100-year vigil over the time capsule in Pioneer Park.

Editor's Note: This article was condensed from the April, 1957, issue of *Starlight*, published by Lone Star Steel Co., which also supplied the photographs.



Core for the bust is set properly before next section of mold is placed. The assembled mold was put in a flask and backed with sand for pouring

...OR SMALL

We make them All!

INTERNATIONAL MOLDING MACHINE COMPANY

LA GRANGE PARK, ILLINOIS

The International Line is designed by experienced foundry engineers who have a practical working knowledge of the problems of the industry.

"There is an INTERNATIONAL for Every Type of Job"

Colorimetric Determination of Silicon in Iron and Steel

By W. B. SOBERS
Chief Chemist
Chain Belt Co., Milwaukee

RAPID determination of silicon in plain carbon, low alloy, and stainless steel of varying compositions is desirable, especially when a large number of samples is to be checked at the same time. The colorimetric method is more efficient for a large number of determinations than the gravimetric method, since it requires less close attention during the time the sample is on the hot plate, eliminates filtering, scrubbing beaker, igniting of silicic acid, and weighing of the silica dioxide residue.

The colorimetric determination takes about 40 minutes. Although this is longer than required by the gravimetric method, several determinations may be run at one time. While the samples are being treated on the hot plate, the blank and sample tests may be set up. For example, the water and acid may be added to the blank test and the water and ammonium molybdate solution added to the sample test before adding the pipetted sample solution.

Another advantage is that the analyst is free to do other laboratory work while doing colorimetric silicons. This is possible because only a small weight of sample has to be dissolved and is not dried to dehydrate the silicon. In addition, more than one analyst can work on the procedure.

The procedure is a modification and simplification of the colorimetric method of Haywood and Wood (*Metallurgical Analysis,* Adam Hilger, London, 1944). Clausen and Rossopoulas of International Harvester Co. modified the method in 1946.

Control accuracy of ±0.02 per cent silicon is achieved. That is about the same variation obtained in gravimetric analysis and should be satisfactory for most steel analyses. Of the elements commonly present in steels, none interferes with the procedure. However, the blank largely compensates for any interference for different types of steels and weight of sample.

The molybdenum blue color is utilized, the reducing agent being stannous chloride. The colored solution is read at 650-mu wave length using a blank solution as a reference.

Determining Silicon in Steel

Procedure A—Transfer a 200-mg sample to a 150-ml beaker. Add 10 ml of 25 per cent sulfuric acid solution and approximately 40 ml of water. Cover beaker and boil gently until sample is dissolved. Do not allow volume to go lower than 20 ml.

Add approximately 6 ml or a slight excess of 2.5 per cent potassium permanganate solution. If necessary, adjust volume to approximately 40 ml; boil for two or three minutes. The solution is reduced and cleared with a slight excess of sodium sulfite solution, approximately 1 or 2 ml. Boil off excess sulfur dioxide (3 minutes) and remove from heat.

Dilute to 100 ml and transfer to a 200-ml volumetric flask, dilute to mark, and mix (1 ml equals 1 mg). Take two 20-ml aliquots (20 mg). Add one 20-ml aliquot called the "blank" to a 150-ml beaker, and the second 20-ml aliquot called the "sample" to a 100-ml volumetric flask. Add the following reagents as outlined and mix after each addition to prepare the "blank" test: 1. 40 ml H_2O. 2. 20 ml 25 per cent H_2SO_4. 3. 10 ml 5 per cent ammonium molybdate. 4. 10 ml 1 per cent stannous chloride. (Add ammonium molybdate and stannous chloride directly into solution without touching sides of beaker.)

To prepare the "sample" test add

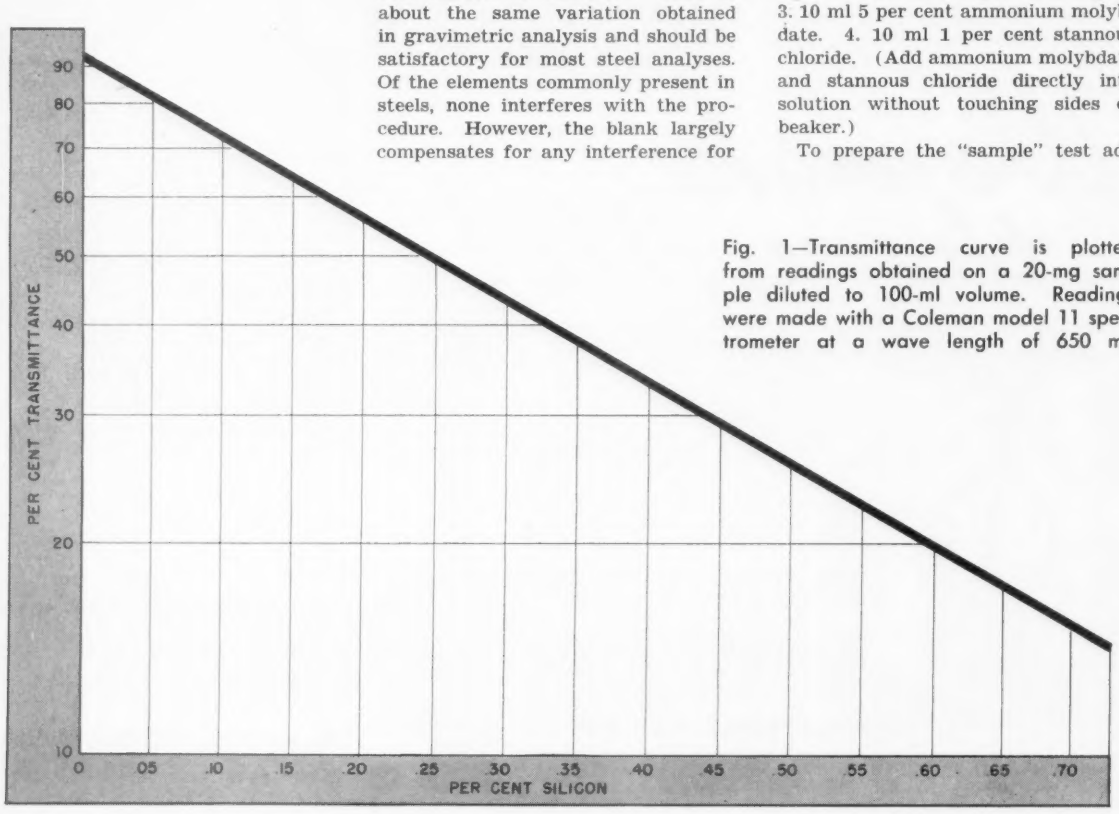
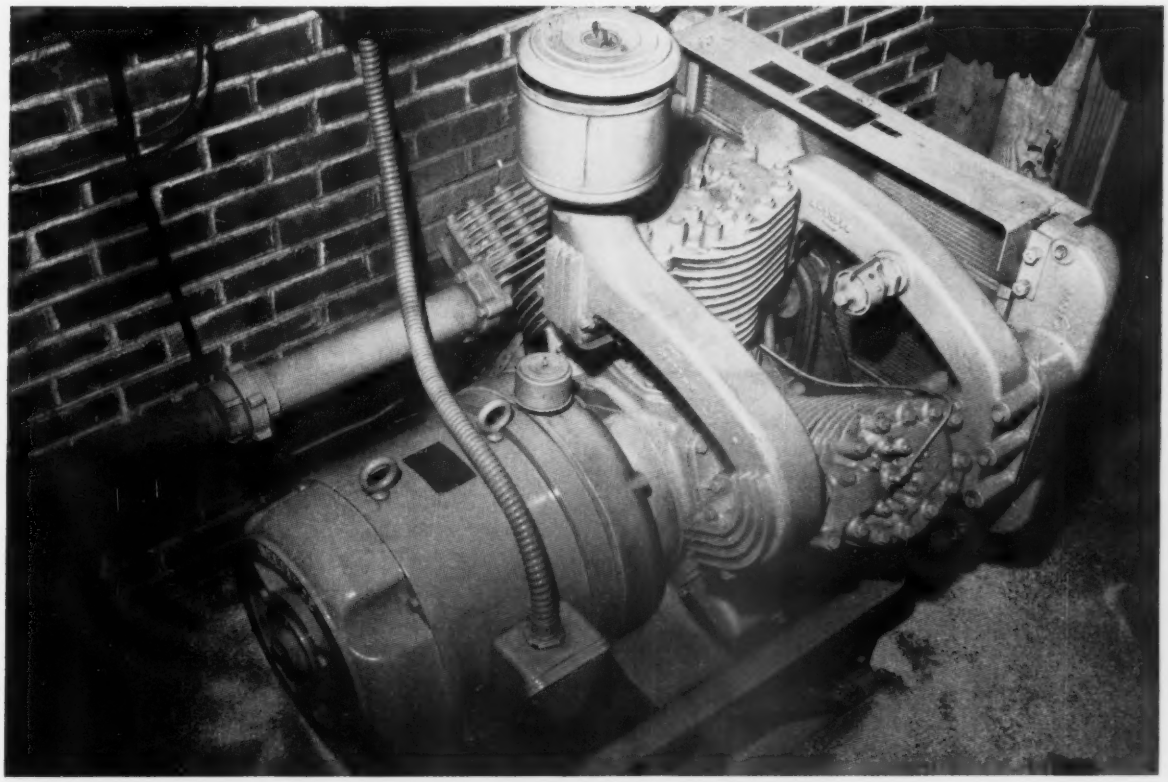


Fig. 1—Transmittance curve is plotted from readings obtained on a 20-mg sample diluted to 100-ml volume. Readings were made with a Coleman model 11 spectrometer at a wave length of 650 mu



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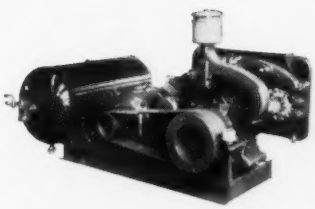

Joy WL-80 "Packaged Unit" Compressor can be delivered ready-to go, complete with air receivers, piping and wiring.

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- *81 to 641 CFM.*
- *Pressures to 125 psi, standard. (High pressure units to 250 psi).*
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- *Force-feed lubrication.*
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. . . And, you have your choice of drives: Direct, V-Belt, Flange-Mounted. In fact, these compressors are available as packaged units, like that shown at the left, delivered complete with air receivers, piping and wiring.

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Get full details by writing for complete information. ● **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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WSW 1-5327

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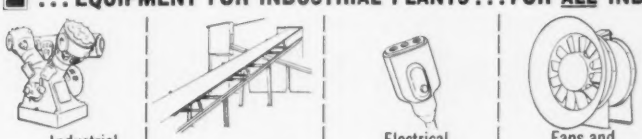


Industrial Compressors | Conveyors | Electrical Connectors | Fans and Blowers

the following reagents: 1. 30 ml H_2O. 2. 10 ml ammonium molybdate. Wash down neck of volumetric flask with a little water and allow to stand five minutes. 3. 20 ml 25 per cent H_2SO_4. 4. 10 ml stannous chloride. 5. Dilute to mark with water and mix. (To keep the stannous chloride solution from coming in contact with neck of volumetric flask, use a 10-ml pipette to transfer the stannous chloride solution into the volumetric flask. Keep stem of pipette wiped dry between each addition of stannous chloride solution.)

Notes on Procedure A—Allow each solution, sample and blank, to stand for at least 20 minutes after adding stannous chloride solution before checking. The results are slightly lower if the colored solutions are allowed to stand for two or three hours. For this reason, the length of time the colored sample stands should be considered when plotting the transmission curve shown in Fig. 1. After standing for 30 minutes, compare at 650-mu wave length, using the blank sample as a reference.

The curve is plotted by using standard steel samples of known silicon content. These steel samples should be of a type similar to that for which the method is to be applied to obtain best results. The silicon content should be distributed over the range for which the method is being applied. Standard sample No. 55c, open-hearth iron, containing 0.001 per cent silicon, was used to establish the zero per cent silicon on the transmission curve.

SOLUTIONS

Sulfuric Acid—25%

750 ml	H_2O
250 ml	H_2SO_4

Add acid slowly to water while stirring.

Potassium Permanganate

1000 ml	H_2O
25 grams	$KMnO_4$

Sodium Sulfite

1000 ml	H_2O
100 grams	Na_2SO_3

Ammonium Molybdate

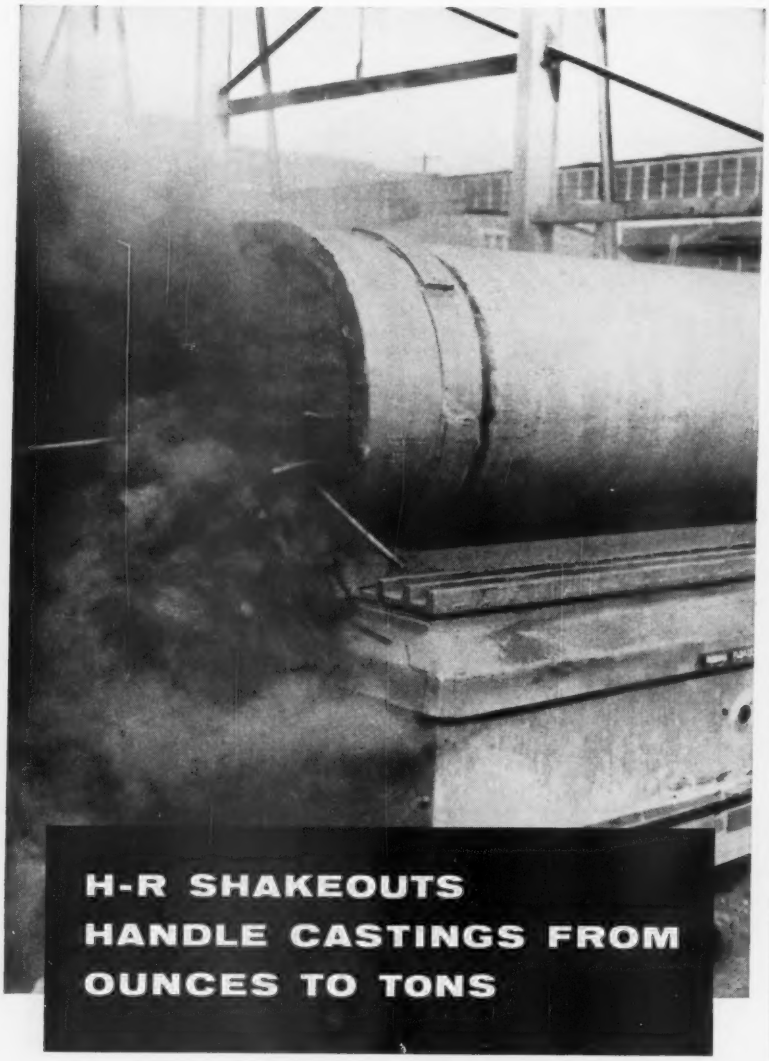
1000 ml	H_2O
50 grams	$(NH_4)_6Mo_7O_{24}$

Stannous Chloride

Dissolve 5.0 grams of $SnCl_2$ in 6 ml of hot HCl and dilute to 500 ml with water. Make fresh every several days.

For control work, if silicon determinations are being run on similar types of steel samples, one blank should suffice for each group or batch of samples being tested. This saves additional time and chemicals.

To hasten dissolving of sample, mix for each determination 40 ml of water and 10 ml of 25 per cent sulfuric acid solution in a large beaker. Preheat and add 50 ml of this hot acid water mix to each sample. Or for each sample, premix and preheat



There is a type of Floatex Shakeout to fit almost any foundry application . . . ferrous or non-ferrous . . . to handle castings from a few ounces to 300 tons. Stroke of each type can be adjusted to improve operation on massive castings, or to protect fragile castings.

These H-R shakeouts also cut time and labor costs. One user saves 12 man-hours per casting . . . another knocks cores out of 400 engine blocks per hour. In addition, where severe noise problems existed, Hewitt-Robins has successfully employed effective methods of noise reduction. To find out how H-R products and services can help you, consult your classified telephone directory for the nearest H-R representative, or contact Hewitt-Robins, Stamford, Connecticut.

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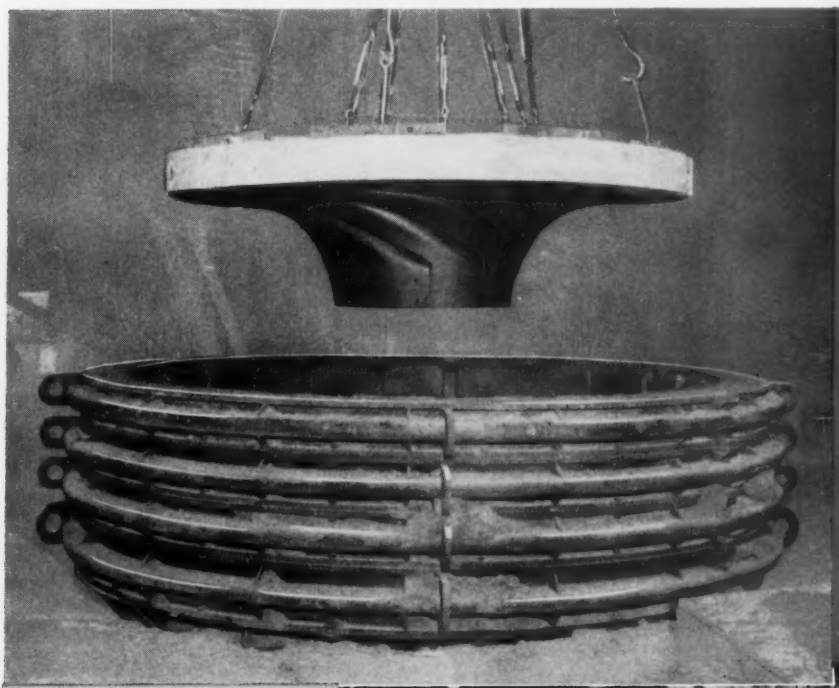
INDUSTRIAL HOSE...VIBRATING CONVEYORS, SCREENS & SHAKEOUTS

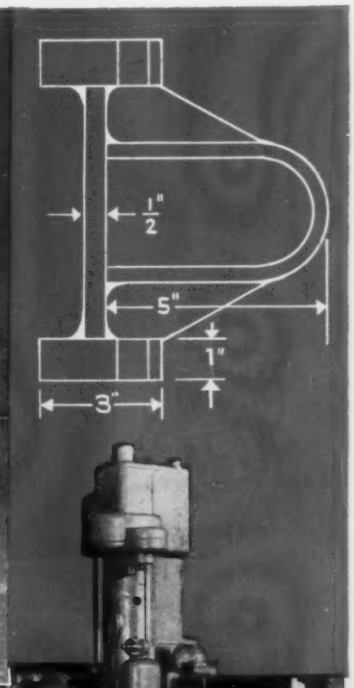
Circle 705 on Inquiry Card—Page 51

This Unusual Steel Flask

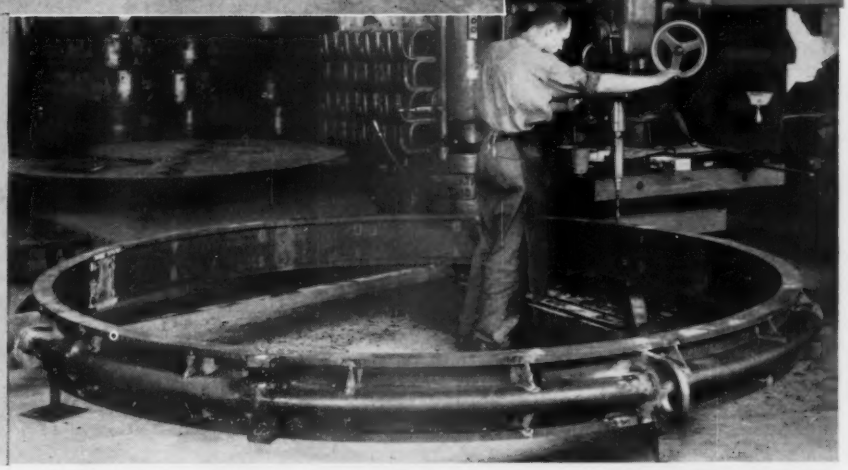
is doing an excellent job for Crown Non-Ferrous Foundry of Chester, Pa.

They pour a 10,000 pound impeller casting in the four section Shanafelt flask which measures 13 feet outside diameter. All the sections are shallow—one 8" deep—which means that no ordinary flask sidewall will give the required strength and rigidity. The enlarged cross section shows the Shanafelt sidewall which met the problem successfully.





The new Shanafelt plant was designed and equipped for only one purpose—making steel flasks. If you have a flask problem, we believe we can help you solve it. At least we'll welcome the chance to tackle it with you.



THE SHANAFELT MANUFACTURING CO.

Established 1893

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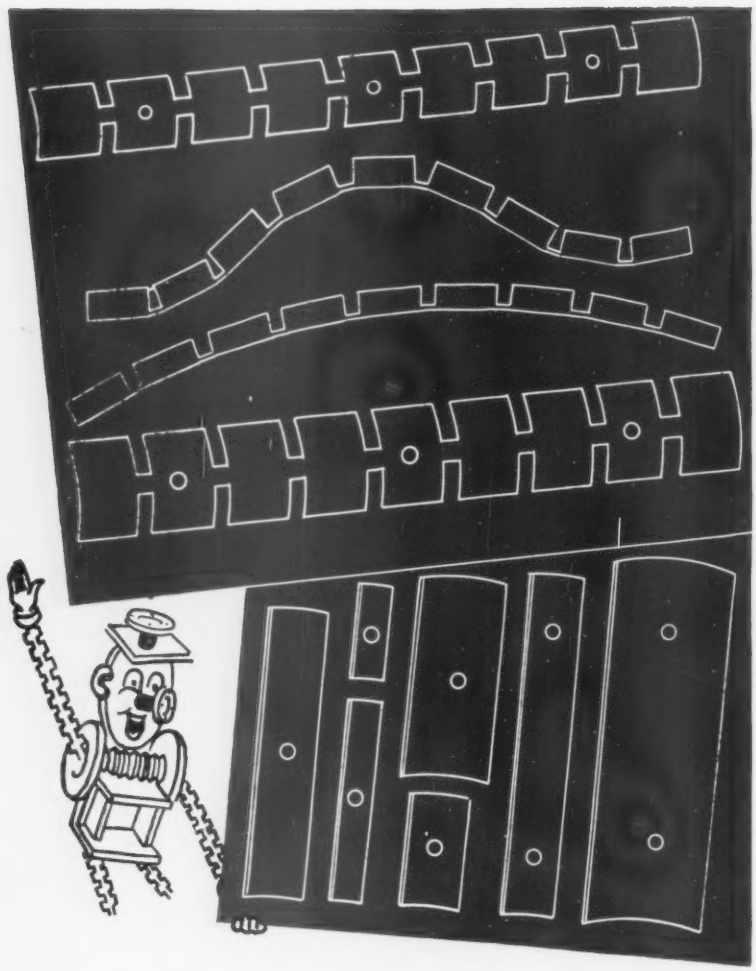


47.5 ml of water and 2.5 ml of concentrated sulfuric acid. This also saves time consumed in mixing the 25 per cent sulfuric acid solution.

The blank color varies from light to a dark straw color and will read approximately 97 per cent transmittance as compared to water at 100 per cent transmittance. The sample color ranges from a greenish-blue for low-silicon steels to a blue for high-silicon steels.

Procedure B — For this direct weighing of sample method transfer a 40-mg sample to a 150-ml beaker. Add 20 ml of 2 per cent sulfuric acid solution. Cover beaker and boil gently to dissolve sample.

Dilute the dissolved sample to approximately 30 ml. Boil and add several drops or a slight excess of potassium permanganate solution from a pipette or dropping bottle. Boil three minutes and reduce solution with several drops of sodium sulfite solution. Boil free of excess sodium sulfite. Dilute the solution to approximately 75 ml and transfer to a 100-ml volumetric flask, dilute to mark, and mix.

Transfer 50 ml of this solution back into the original 150-ml beaker and add 10 ml of water. Treat as outlined under procedure *A* for blank solution. The remaining 50 ml in the volumetric flask is used for the sample solution and finished as outlined under procedure *A*.

Notes on Procedure B—Silicon in steel goes in solid solution in the ferrite. This permits obtaining a representative sample on a few milligrams of sample for its determination by color.

Procedure *B* could be applied to advantage if there is a limited amount of sample available to check for per cent silicon. For example, it could be used in a sorting job involving mixed steel stock or steel parts, if silicon could be used to separate the mixed steel. A few milligrams of filings could be used as a sample.

Another time-saving advantage of the color method compared to the gravimetric method is that the color silicon determinations can be estimated by visual observation.

We have found the silicon results on steel samples to be slightly higher by procedure *B* if the results are computed from our curve plotted by procedure *A*.

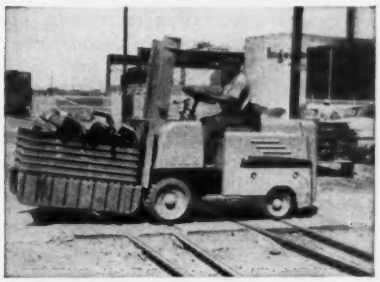
Other Silicon Determinations

Procedure C—This is the procedure used for determining silicon in higher silicon irons and steels such as white iron, chill iron, gray iron or pig iron.

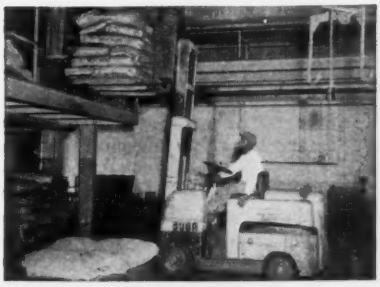
For material containing from 0.60 to 1.20 per cent silicon, weigh a 200-mg sample into a 150-ml beaker;

ALLIS-CHALMERS FORK TRUCKS

Dumping material by the ton — one of many daily operations.



Tracks are crossed 30-40 times daily under load without truck damage.



Inventory simplified, storage increased with ton-at-a-time tiering.

Cut Handling Time 30% at Chicago Malleable Castings Co.

In two years, Chicago Malleable Castings Co., a leading mid-western foundry, has been able to reduce handling time 30% on all materials handled with an Allis-Chalmers FT60-24 Fork Lift Truck.

In specific instances, such as the boxcar unloading of refractory brick, the truck has reduced by 90% the handling time formerly required by conveyor system.

Equipped with a rotating device, the truck is also used for handling foundry sand and other bulk materials, and also for loading, transporting, and unloading such products as bonding clay, machinery, and rough castings. All these operations have been accomplished more efficiently and in less time than was possible with equipment formerly used.

So impressive has been this performance record, that Chicago Malleable recently purchased another Allis-Chalmers truck for use in other areas of their modern plant. Used primarily for handling finished castings, including trailer-truck and boxcar loading, this truck handles 140 tons of materials in an average eight-hour day.

But utility is only part of the story. Maneuverability, ease of handling, low maintenance, and dependable, long-lived operation — even under adverse foundry operating conditions — are all features combined in every Allis-Chalmers Fork Lift Truck. It's the winning combination for progressive foundries throughout the country.

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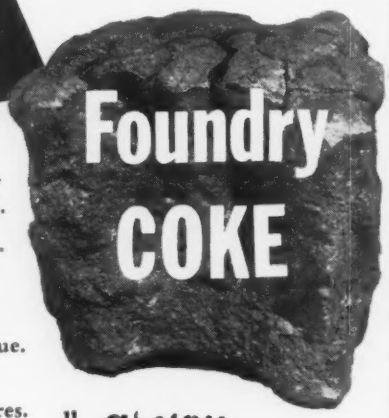
Write today for your free copy of our 36-page, fact-filled booklet which explains in detail the many exclusive features that make Allis-Chalmers Fork Lift Trucks the choice of industry everywhere.

ALLIS-CHALMERS A-C

BH-2

Terre Haute Special



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NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.

Circle 710 on Inquiry Card—Page 51

proceed as outlined under procedure *A* for silicon in steel, with the exception that less sample is used by taking two 10-ml aliquots, one for the "blank" and one for the "sample." Apply same curve as plotted for steel and multiply the results by two to find per cent silicon.

For irons containing from 1.20 to 2.50 per cent silicon, weigh a 100-mg sample into a 150-ml beaker. Proceed as outlined under procedure *A*, with the exception that approximately 3 ml of potassium permanganate solution is used to oxidize the sample, and two 10-ml aliquots are used, one for the "blank" and one for the "sample." Apply steel curve and multiply the results by four to find per cent silicon.

Notes on Procedure C—For the above material a 200-mg sample may be used and diluted to 400 ml. Pipette two 5-mg-aliquots for the "blank" and "sample."

Add an additional 10 ml of water to the blank test for the higher silicon irons so that the final volume will be 100 ml.

Using the above method, less accurate results for the determination of silicon by color can be expected for high silicon irons than with the gravimetric method.

Brass and Bronze Alloys Are Discussed in New Handbook

A comprehensive, 64-page handbook, "Copper Base Casting Alloys," has been published by Federated Metals Division of American Smelting & Refining Co., 120 Broadway, New York 5. The handbook provides information of specific use to the designer and the foundryman.

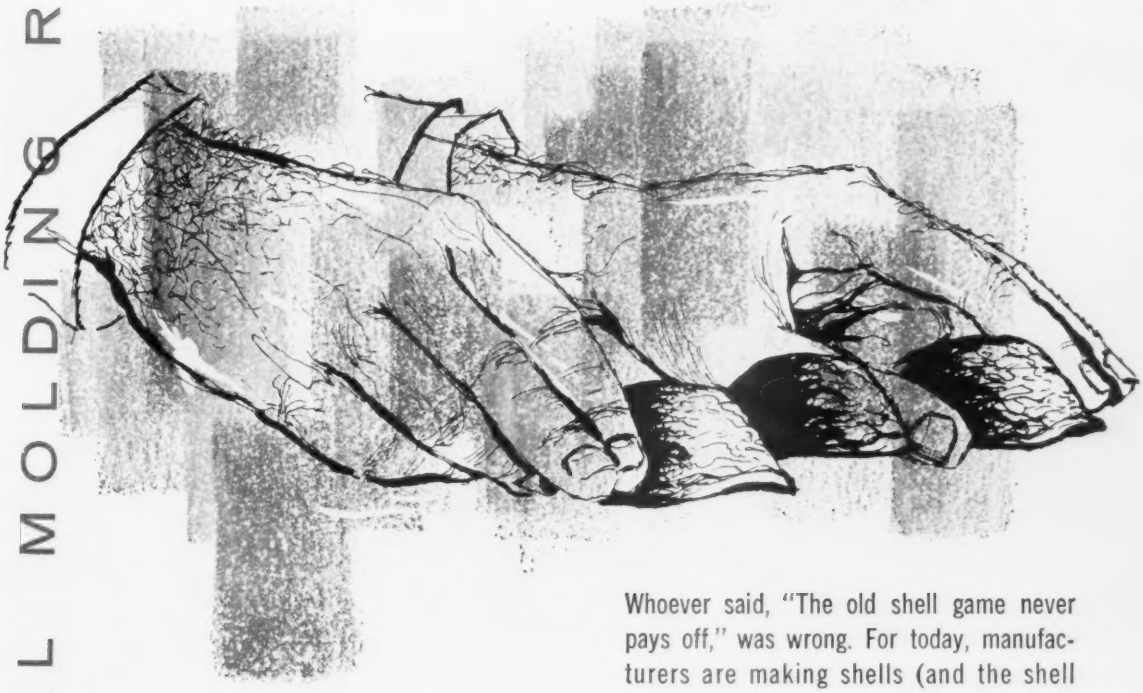
The text is divided into five sections: Guide to the Selection of Copper Base Casting Alloys; Characteristics and Range of Properties; Miscellaneous Specifications; Foundry Practices; Common Casting Problems and Their Causes.

SAE Issues 1957 Handbook

The Society of Automotive Engineers has published its 1957 *SAE Handbook* containing lists of officers, technical board members, technical committee personnel, representatives to other technical organizations and board rules and regulations. Approved standards and recommended practices covering a wide range of ferrous and nonferrous metals and nonmetallic materials are included in the 1176-page volume. The next edition will be published Jan. 1, 1959. Price of the *Handbook* to nonmembers of the society is $20.

PLENCO SHELL MOLDING RESINS

Careful consideration of the shell can be most rewarding



Whoever said, "The old shell game never pays off," was wrong. For today, manufacturers are making shells (and the shell molding method) pay handsome rewards in the production of molded parts. We refer, especially, to those companies who rely on Plenco phenolic molding resins.

Exactly what are the rewards? The answer is simple: lower production costs.

For example, the elimination of considerable machining and finishing. The higher yield from metal. The reduction in percentage of rejects and increased production speed.

There are rewards in shell molding with Plenco phenolic resins. Consider it carefully. Consult with Plenco.

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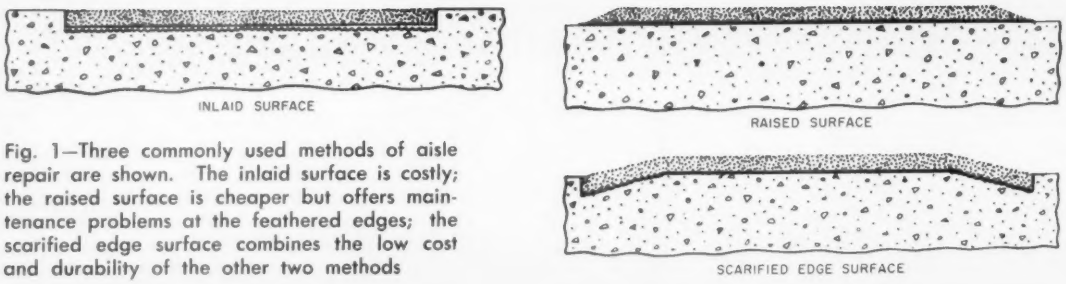

Fig. 1—Three commonly used methods of aisle repair are shown. The inlaid surface is costly; the raised surface is cheaper but offers maintenance problems at the feathered edges; the scarified edge surface combines the low cost and durability of the other two methods

Fig. 2—Edge-scarified floor is finished quickly by workmen. Cost and scarification debris are less than that for an inlaid surface

Fig. 3 — Extensive scarification for inlaid surface upsets plant operation, requires extra cleanup, resulting in higher cost

How To Save Money on

AISLE RESURFACING

By **WALTER MAGUIRE**
President
Walter Maguire Co.
New York

SEVERAL products and application methods for industrial aisle and floor resurfacing are in use today. Each has certain advantages and disadvantages. Three methods, using concrete as the flooring material, are described here.

Inlaid Surface—Old flooring is scarified with jackhammers, the worn-out material removed, the area cleaned, a grout applied, and a new heavy-duty concrete flooring laid down. This is the most direct way of resurfacing. It also is expensive since the ripping-up operation is time consuming and involves considerable labor. Dust and rubble created by such extensive scarification result in expensive cleanup problems. In recent years, to reduce cost, use of a raised surface floor with feathered edges has been attempted and has met with limited success.

Raised Surface—The floor is not scarified, but a nonreversing neoprene-latex bonding agent is used to hold the new surface to the old one. A ¾-in. heavy-duty emery aggregate concrete flooring is used for long-wearing surface. Since square edges with a vertical drop of ¾-in. would make it difficult for vehicles such as forklift trucks to get on and off the raised aisle, the heavy-duty concrete is finished at each side to form a small incline between the raised surface and the original flooring.

The incline solves the problem of getting on and off the aisle with a vehicle, but it has certain structural disadvantages. The concrete incline

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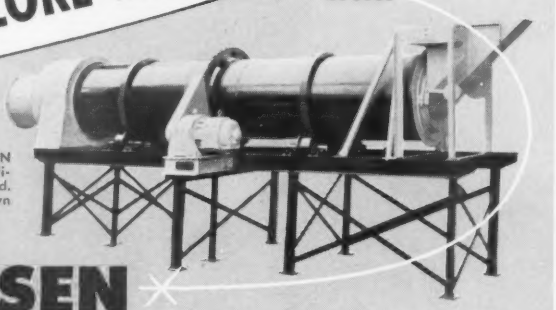

This 32" x 14' MADSEN Dryer was built specifically for drying core sand. Leg frame sections shown are optional.

MADSEN

COUNTER-FLOW DRYERS

Get the advantages of MADSEN Counter-Flow DRYERS for your core sand drying operations. Rugged construction means long trouble-free service and MADSEN superior engineering assures efficient heating at minimum fuel costs.

Dryers are mounted on sturdy I-beam frame which carries the trunnion bearings and assemblies. MADSEN Dryers have a floating counter-weighted cast iron seal, heavy cast steel dryer tires, and skip tooth ring sprocket or machined girth gear. Dryers may be fired with either Natural Gas, oil atomized by steam or by low pressure burner. Write for literature.

MADSEN also builds a complete line of cyclone-type dust collectors and dust collector exhausters to meet your needs.

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Equipment that Serves

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Only Semet-Solvay has 4 coke plants to serve you. There's one in your vicinity. For fast service, for dependable, uniform coke that means "Better Melting" specify Semet-Solvay Foundry Coke.

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For Better Melting

Circle 714 on Inquiry Card—Page 51

for example, does not have sufficient depth to stand the punishment of heavy vehicular traffic. Experience has shown that, in a matter of a short time, the feathered edges begin to crumble and break off.

Edge Scarification—This method is said to preserve the best characteristics of the first method with the dollar savings of the second.

A triangular trough, ¾-in. deep at its deepest point, and extending 12 in. from the edge of the aisle into the center, is jackhammered out of the old floor at each side of the area to the resurfaced as shown in Fig. 1. From a cross-sectional view, the trough has a wedge shape.

After a nonreversing bonding agent has been applied, a heavy-duty emery aggregate concrete flooring, ¾-in. deep, is laid down on top of the old surface and into the two troughs. Thus an incline is formed between the top of the new surface and the original flooring at either side of the aisle.

The new aisle looks like the raised surface aisle with feathered edges. However, unlike it, the edge-scarified aisle provides an all-over, ¾-in. depth at the inclines as well as in the middle of the aisle.

One of our customers, a large automotive manufacturer, estimates that it costs approximately $1.35 per square foot as scarify and install a ¾-in. thick inlaid surface floor with emery aggregate concrete heavy-duty flooring.

It would cost only 93 cents per square foot to put in an edge-scarified floor with the same heavy-duty material. The saving amounts to 31 per cent.

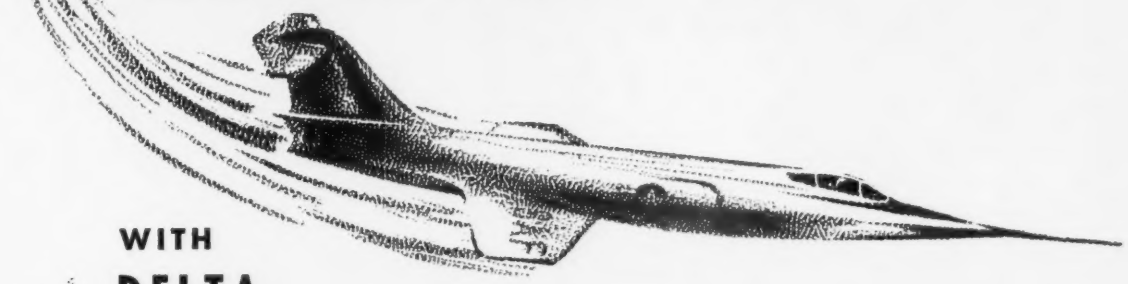
Repair costs drop because a properly laid and cured edge-scarified floor, which utilizes emery aggregate, eliminates the periodic maintenance of a feather-edge floor.

Names Five Subcommittees on Material Handling Education

Five subcommittees have been appointed to carry out the expanded 1957 program of the College-Industry Committee on Material Handling Education. Harold T. Amrine, head of the department of industrial engineering, Purdue University, is chairman of the committee.

The five new subcommittees are Conveyor Film, Slide Film, Case Problems, Publicity and Research. Respective chairmen are John B. Day, Georgia Institute of Technology; Prof. James M. Apple, Michigan State University; James R. Bright, Harvard University; D. H. Bitney, Union Steel Products Co.; and Harold T. Amrine.

COVER GREATER SURFACE AREA ...AND GET SMOOTHER... CLEANER CASTINGS... *at lower cost!*



WITH

DELTA SUPERKOAT WASH

FOR ALL TYPES OF METALS

Delta SuperKoat Wash is recommended for Steel, Gray Iron, Malleable and Non-Ferrous castings. It's easy to mix and apply uniformly to green or dry sand and baked core surfaces by dipping, swabbing, spraying or brushing.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

NOTE THESE IMPORTANT ADVANTAGES OF DELTA SUPERKOAT WASH:

1. **NO PRECIPITATION OR SETTLING —** When thoroughly mixed, wash will stay in suspension indefinitely.
2. **EASY TO APPLY —** It can be dipped, swabbed, brushed or sprayed on green or dry sand and baked surfaces.
3. **RAPID, DEEP PENETRATION & EXCELLENT ADHESION —** Quickly anchors itself 5 to 7 grains deep in sand surfaces.
4. **NON-REACTIVE — LOW GAS —** Will not react or produce gas in contact with molten metal.
5. **REDUCED CLEANING COSTS —** Cast surfaces are smoother and castings are cleaner.
6. **WILL NOT FLAKE —** When completely dried, the wash is thoroughly bonded to the sand surfaces.
7. **HIGHLY REFRACTORY —** Has an unusually high fusion point.
8. **ELIMINATES SAND FUSION AND BURN-ON —** Flowing metal will not crack or rupture wash during pouring.
9. **ECONOMICAL TO USE —** Covers a greater surface area at a lower cost per pound of wash.

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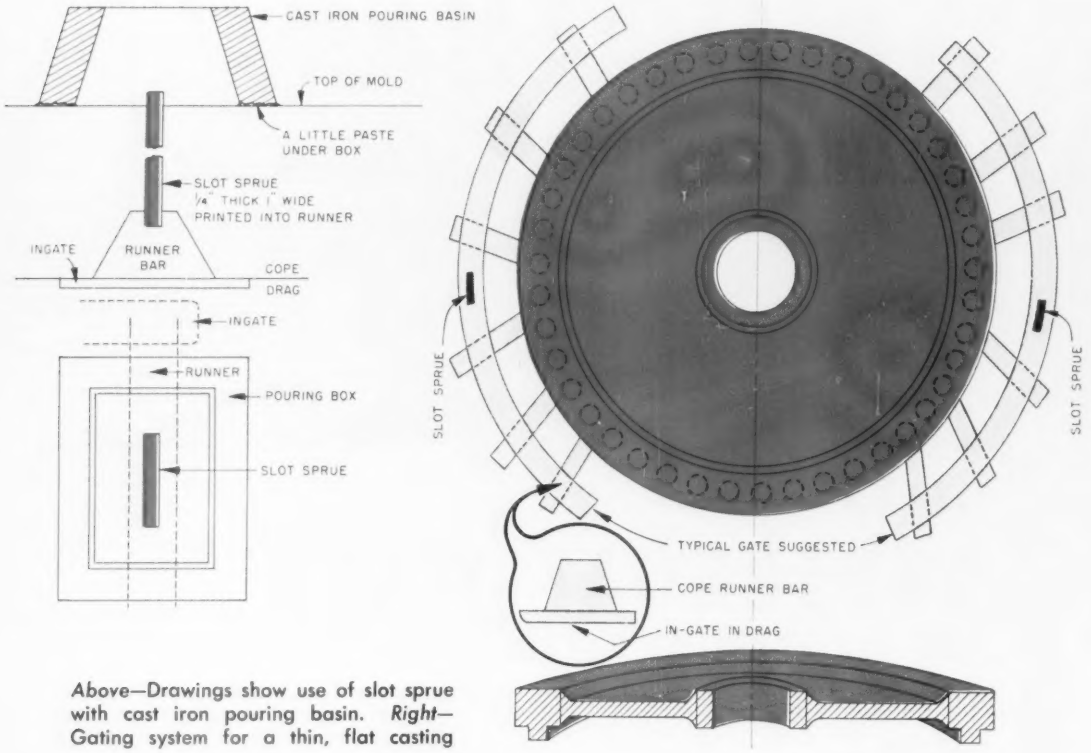
MILWAUKEE 9, WISCONSIN

Trouble Shooting

By C. W. AMMEN



Above—Drawings show use of slot sprue with cast iron pouring basin. *Right*—Gating system for a thin, flat casting

Identify Defects Properly

Dear Charlie:

Some time ago I had a nice chuckle over snaking away from a competitor a nice big fat run of aluminum. Now don't get me wrong, I did not get the job by chopping heck out of the price. Delivery and other items entered into our getting the job.

The casting is one of the major components of some sort of wrapping machine. It is shaped like a solid web gear blank. One side is plain; the other side has a series of round bosses on the rim vertical to the face. Diameter is 30 in., rim 1½ in. thick, bosses ¾ in. diameter and 1 in. tall on the center line of the rim, which is 2 in. wide. The web is ½ in. thick.

Aside from buckles, shrinkage and scabs, we have run into a condition which looks like alligator skin running in an irregular pattern on the cope surface, starting at the in-gate and working out in a fan-like manner. At first this was thought to be dross, but no dice. The surface is full of irregular holes which, for the most part, are elongated in shape. The machined casting also shows these patches, which appear gray. When picked with a sharp instrument they act and look like a compressed pile of very thin shingles, or like a piece of sheet mica. The defect comes and goes.

My trouble seems to be in the correct identification of defects. Would appreciate a little info on buckles, rat-tails and so forth in aluminum.

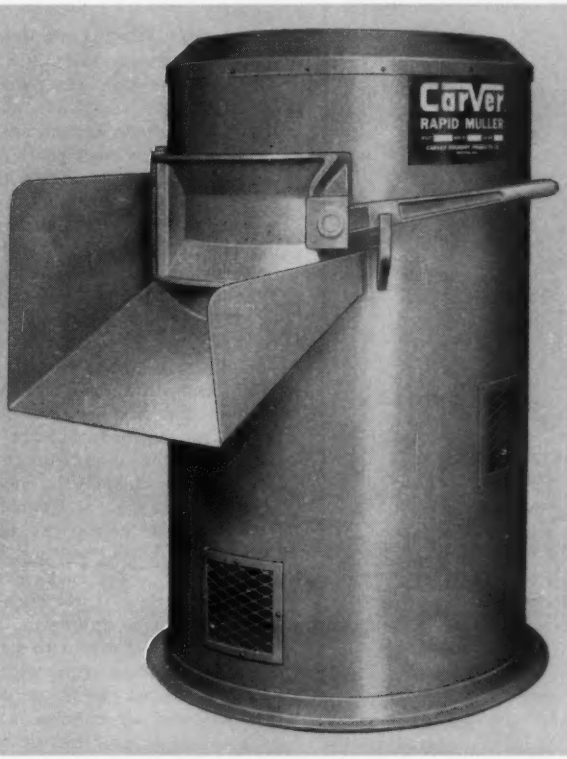
Sincerely,
Sam

Dear Sam:

It's a good thing you sent along some sections of the scrapper. You know, it's one heck of a job to identify defects from a written or oral discription, and even when you come face to face with them it's sometimes a bit of a problem.

Before getting into the matter of alligator skin, I want to point out that you have several spots of what seems to be air porosity at apparently an in-gate. Now here's a very elusive and confusing defect which is probably one of the most common and mistakenly identified defects of them all. I've heard many a gink, after examination of this type of defect, holler gas or gassy metal. A casting after machining will often show random spots of rounded to odd-shaped holes on the cope side;

NEW CarVer RAPID MULLER



Patented, self-cleaning mixing arm, with replaceable, wear-resistant NiHard end pieces.

FAST! A BATCH EVERY 76 SECONDS!

Not only does this revolutionary new machine mix core sand *fast* . . . the mulling action is so thorough that you *save up to 30% in binder!* Each grain of sand receives an equal coating of binder, so that the finished mix is absolutely free from lumps or wet spots!

No more cleaning or maintenance problems! The new Carver Rapid Muller mixing arm does most of the cleaning itself. And it's easy to reach inside and clean, without awkward wheels and paddles to get in the way. Maintenance? There is only *one* moving part . . . *eliminating wear and costly repairs.* You can *rely* on the Carver Rapid Muller because of its *extreme simplicity* in design. Takes up only 7 square feet of floor space — *the most compact muller on the market!*

Most important, your initial investment in the Carver Rapid Muller is *two or three times lower* than most other makes!

COMPARE CARVER WITH ANY OTHER MULLER -- RIGHT IN YOUR OWN FOUNDRY! Carver will place its Rapid Muller alongside *any* other muller and let its performance speak for itself. *You be the judge* — and let the best muller win!

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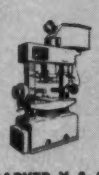
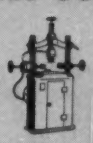


CARVER V & S Core Shooters



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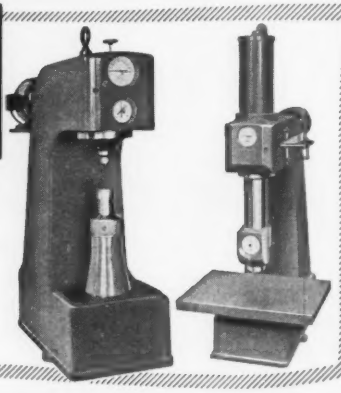

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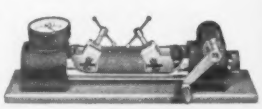
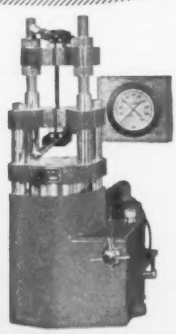
Write today for more information
DETROIT TESTING MACHINE COMPANY
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sometimes these spots are nice clean holes all by themselves, then other times they are full of dross and oxide. They are one and the same defect which often is identified as two different defects with two different causes.

Porosity? Gas? Let's take porosity. Now there really is a distinct difference between gas porosity and air porosity. And what about our friend steam? So around and around we go. For the most part, gas porosity in aluminum is usually classified as the condition where the metal has been gassed and the resulting casting is full of finely divided little gas holes throughout the metal structure. The defect classified as air porosity, however, is mostly air bubbles located on the cope surface. Sometimes air porosity adjacent to the gate is mistaken as a shrinkage porosity.

Plain Old Air Bubbles—Air porosity is caused by turbulence and agitation of the metal in the sprue, runners, in-gates, or the mold cavity itself. Plain old air bubbles. The same type of defect can be caused by steam bubbles resulting from high moisture or a wet spot. Frequently, air bubbles from turbulence or from air sucked in at the sprue or gating system are confused with steam bubbles. Sometimes you will have a combination of both gassed metal porosity and air bubbles.

Aluminum, due to its very low density as compared with that of the copper-base metals, is susceptible to having air bubbles stirred up and introduced into the stream of metal entering the mold cavity. These bubbles cannot be dispersed too easily and can be carried along into the casting. Despite all the available papers, texts, etc., devoted to aluminum casting defects, you still see some sprue and gating systems which cannot help but aerate the incoming metal.

Let's melt the aluminum under complete control. With great care we degas the melt, maybe even go to the extreme of vacuum degassing. Then we check carefully the temperature with a well regulated pyrometer. Finally some clown carries it out to the floor and pours it into an egg-beater gating system from a height of 2 ft above the sprue. When machined, the cope shows up full of holes like cheese. We holler, "What happened?" Gassy metal, too hot, or a wet mold may be blamed but nobody says air bubbles.

Temperature Too High—All this talk about air bubbles is mostly a means of leading up to your so-called alligator skin which, in fact, is a very common defect caused by an excessively high pouring temperature. It

Makes a Good Impression with Sand

Smith L-O Core Oil

Compatible as Smith L-O is with sand, we recognize that there are always certain conditions that require specialized attention. We suggest, therefore, that you call in a Smith Foundry Service Man — a person of broad, "shirt-sleeve" experience — who will study your conditions and come up with a sound recommendation on the grade of Smith L-O you should use. Take advantage of this valuable assistance, for his help is further proof that Smith L-O *stands also for a service as well as a product.*

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SILVERY IRON GLOBE FERROALLOYS

Widely used in the production of gray iron, steel, and malleable castings and in open-hearth and electric steel making processes.

Produced in a blast furnace from an all-virgin ore burden, Globe Silvery contains little or no residual elements.

Globe piglets can be handled conveniently and economically.

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Circle 720 on Inquiry Card—Page 51

is classified as surface shrinkage and it causes the drawn, discolored look with the surface holes and pocks. This defect is more often classified as burnt metal—a complete misnomer. It runs from a dark black color to a light gray and usually appears on flat surfaces—always on the cope side of the job. Its appearance and the fact that it comes from excessive pouring temperature is probably the reason it is called burnt metal. It does for a fact look burnt.

A straight-edge bridged across the defect will usually show it to be depressed or shrunken. Its cause in castings such as yours and others with flat areas is usually an attempt to run a large area through too few or a single gate, and to prevent a misrun the founder resorts to a high pouring temperature.

A large, thin, flat casting can be run at a surprisingly low pouring temperature with a properly designed sprue, runner setup and a sufficient number of in-gates. Although a casting may be relatively simple in design and have even and properly designed sections, an insufficient number of in-gates will sometimes fool you. Shrinkage adjacent to the gate often shows on a casting poured through a single gate. The trouble is caused by the creation of a hot spot at the single entry point which makes this area feed last. I have seen a riser added to take care of this type of defect when all that was needed was to add one or more ingates. Design your gating so as to prevent aeration of your incoming metal, use a sufficient number of entry points so as to permit reduction in pouring temperature, choke the sprue or sprues, pour steadily close to the basin and you will eliminate your alligator skin, air bubbles, hot spot, shrinkage, etc.

Look for Holes — Examine your sprues. If they are not smooth and unbroken on the outer surface, but

"Well, back to the old grind!"

Ferroalloys of Highest Purity

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are full of holes, you are aerating the metal. This holds true for your runners, etc. A gating system in aluminum which does not have sufficient in-gates, and which cannot be choked and kept choked from the word go (yet still deliver a steady and sufficient supply of metal to the mold cavity), is a good gate to make scrap. A down-sprue ¼ x 1 in.—sometimes called a slot sprue — is a very efficient means of preventing aeration and of providing a good choke with good flow properties.

As for rat-tails and buckles, they seem to go hand in hand; eliminate one and you more or less kill both. A rat-tail on a broad cope surface in aluminum has plagued many a foundryman.

A great many of them believe it to be a product of low green compression, high moisture, low perm, hard ramming and lack of elasticity of the molding sand. You can add ½ to 1 per cent by weight of 200-mesh soft wood flour to provide a bit of expansion in your facing, but I'm a firm believer in the use of small additions of cereal in the facing to provide a higher resilience, notwithstanding the fact that this lowers the flowability somewhat and requires more careful ramming.

The correct identification of a casting defect is the most essential point in its elimination.

Sincerely,
Charlie

Brochure Describes 60 Films On Work Simplification

A 20-page brochure describing 60 films on work simplification methods of American industrial concerns is available from the Industrial Management Society, 330 South Wells St., Chicago 6, Ill. Entitled *Work Simplification on Film,* it supersedes a smaller booklet with the same name.

These films were placed in the group's loan collection for winning awards in annual IMS methods improvements competitions and may be rented for five-day periods. They include "Improvements through Work Simplification," "The Bottom Board Problem" and "Inspection and Assembly of Nuts and Bolts," all products of Texas Foundries Inc., Lufkin, Tex.

All films are 16 mm, and many are in color. They run 10 to 15 minutes each. Optical sound, silent and magnetic sound films are included. Both office and plant situations are described.

DINGS Rectangular Suspended Magnets save you money! They protect machinery against tramp iron damage by pulling iron out of the deepest burdens on high-speed belts, where other types of magnets are ineffective. "In-Line" models extract iron *parallel* to burden travel and at the same speed to remove long pieces before the trailing edge can rip the belt. They are automatically self-cleaning. No manual labor is required; there's no danger of accumulated iron dropping onto the belt if power fails; there's no dribble or carry-over.

Check all the advantages of Dings Rectangular Magnets . . . their higher efficiency and superior design often do a better job of iron removal than a larger, more expensive magnet of a different type. Send for complete details now!

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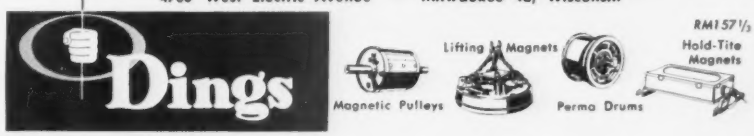

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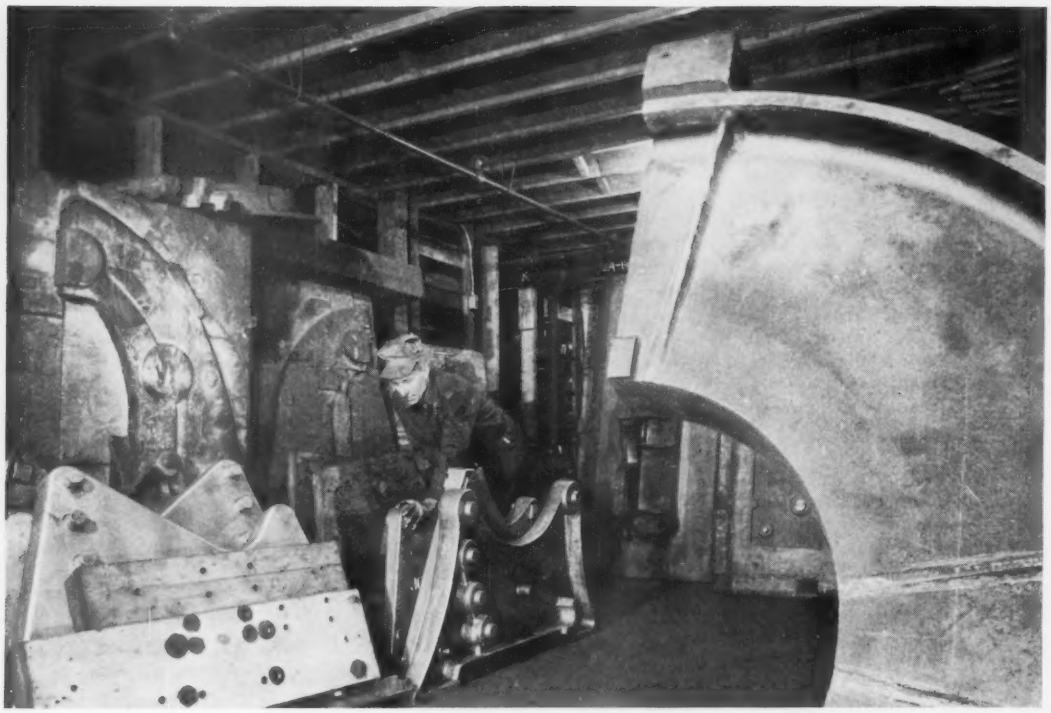


Automatic sprinklers protect the storage area where customers' patterns valued at $2 million are stored. Such protection helps assure continuity of business

Sprinkler System Reduces Insurance Cost

By R. W. WILDER
Secretary
Elkhart Foundry & Machine Co.
Elkhart, Ind.

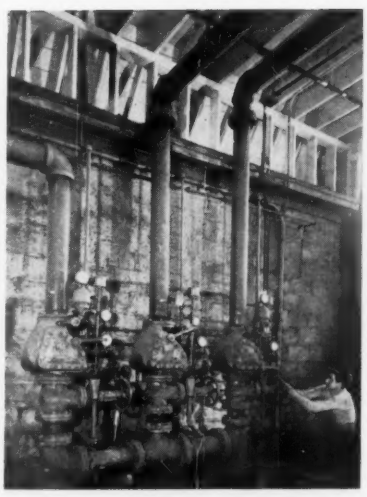
MORE than four times the amount of insurance coverage at about one fifth the previous cost—that's one benefit of the fire protection system we have installed at Elkhart Foundry & Machine Co., Elkhart, Ind. And although it is an important part of the story, it by no means is all of it.

Elkhart Foundry does job casting for a wide variety of customers who use gray iron castings. Working with fire every day has given us a healthy respect for it, and we always have been aware of the dangerous possibilities of a plant fire. Although any foundry might have a serious fire, steps can be taken to help prevent crippling damage.

Like many other foundries, our plant has grown through the addition of new space as it has been needed. As a consequence, the actual building is a hodgepodge of various roof levels. The levels make installation of a sprinkler system difficult, and we were not sure that we could afford such an installation. After an appraisal of our plant by Lloyd-Thomas Co. and a review of our insurance coverage, however, it appeared that we could not afford not to.

If any further convincing was necessary, a shocking example provided it. A friend who operated another foundry in the other end of town was at my house when he received a call that his plant was on fire. Although firemen made a successful attempt to save the office structure, the entire plant and its contents were destroyed.

This disaster was a painful but dramatic demonstration of the economic facts we already had discovered. Our buildings and equipment were insured for only $212,000, nowhere near the actual cost less depreciation, and our business interrup-



Three of the five automatically opened valves which control the dry pipe sprinkler system

NO FUMES IN THIS FOUNDRY

Discharge from these two furnaces at Dodge Steel Co. is entirely eliminated.

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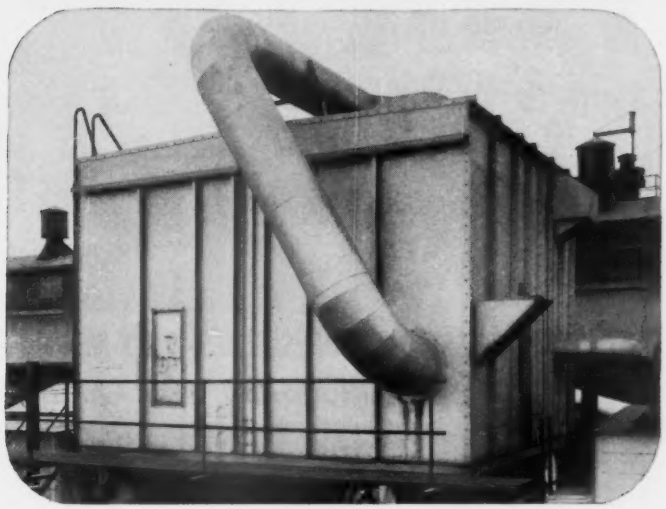
The Wheelabrator Dustube Collector at Dodge Steel Co. that provides nearly 100% collection efficiency.



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The dust, fumes and gases emanating from these electric furnaces are eliminated from the atmosphere by a Wheelabrator Dustube Collector installation. 852 lbs. of foreign matter are filtered out and trapped by the Dustube's filter tubes every day. The installation has received the approval of the Philadelphia Air Pollution Control Division by entirely eliminating the fume discharge. During a year of satisfactory performance, the maintenance on the collector has been negligible.

Twenty-five prominent plants are now ventilating 37 furnaces with Wheelabrator Dustube Collectors that handle a combined total of nearly a million C.F.M. of air. The experience gained in solving the variety of problems posed by these installations is at your disposal. Use this accumulated experience to arrive at the proper solution of your specific furnace control problem.

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tion coverage was an inadequate $50,000.

The thought of the replacement costs which we, instead of my friend, might be facing was staggering. We could not afford adequate insurance to cover such a contingency as well as the consequent business interruption unless we qualified as a preferred risk.

Our sprinkler system was the ideal solution. Our average yearly insurance premium was $3574 on the original, inadequate coverage. Since installation of the sprinkler system we carry $926,000 insurance on our building and equipment replacement costs and $350,000 business interruption insurance, at an average yearly premium of $741. The sprinkler system thus is enabling us to carry more than four times as much coverage for about a fifth of the cost of our previous insurance.

The entire sprinkler system, including installation, was made by Automatic Sprinkler Corp. of America and cost $32,000. Although time payment plans are available, ours was a cash contract, paid 85 per cent as the job progressed and the final 15 per cent upon approval of the underwriters.

Since our operation has no unusual hazards requiring special consideration, a differential-valve, dry-pipe system was used throughout the plant and offices. This means that unnecessary watery damage, such as from a pipe leak, is avoided because water does not enter the system until a fire melts a fusible link in a sprinkler head somewhere in the plant. The temperature at which these links melt is varied.

Heads protecting the cupola, for example, melt at a higher temperature than those in the office so that heat resulting from ordinary operations does not accidentally set the system in operation. Any unusual heat will cause a sprinkler head to open, and the resulting change in air pressure in the pipes automatically starts an alarm and causes the main valves to open, sending water to extinguish or check the fire. Other sprinkler heads then discharge only when the temperature in their areas rises to a dangerous level.

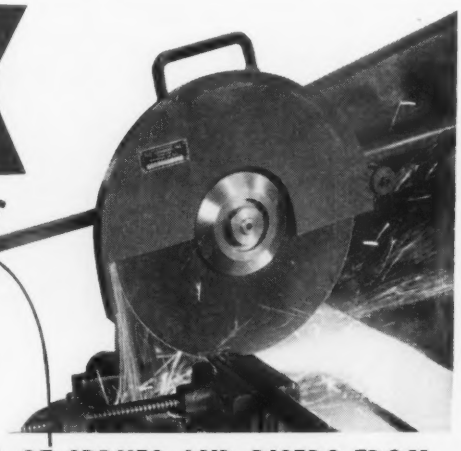
Sprinkler installation engineers solved the drainage problems caused by varying roof heights with a minimum number of valves. In addition, they were able to install the entire prefabricated system without interrupting regular production or operations.

Sprinklers throughout the storage area protect about $2 million worth of customers' patterns and thus help to assure the continuity of their business as well as ours. This protection might be a valuable sales point for firms soliciting new business, and it is reassuring to those customers who entrust their patterns to us for safekeeping. The knowledge that we have done everything we can to fulfill this responsibility to them and to our employees and ourselves is as gratifying to us as it is to our customers.

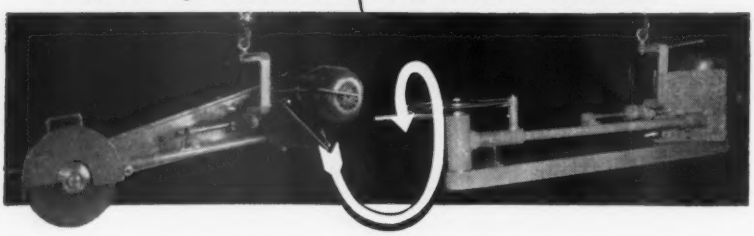
FOX

SWING FRAME

CUT-OFF MACHINE



FOR FAST REMOVAL OF SPRUES AND RISERS FROM BRONZE, ALUMINUM AND IRON CASTINGS!



FULL MANEUVERABILITY THROUGH 180°

The new Fox Swing Frame Cut-Off Machines have been designed to take advantage of the new type "flexible" cut-off wheels. The machine has full maneuverability through 180°. It is especially recommended for the removal of sprues and risers from bronze, aluminum and iron castings.

Available in two sizes, 16" and 20". Write for Catalog!

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OLIVER BUILDING PITTSBURGH 22, PA.

Castings improved 6 ways with one compound

...CALCIUM CARBIDE!

New calcium carbide injection process:

- **reduces sulfur content**
- **helps eliminate shrinkage porosity**
- **increases machinability and prolongs machine-tool life**
- **reduces chill**
- **increases fluidity**
- **promotes uniform hardness throughout castings**

Section of untreated casting

Section of treated casting

An example of how a calcium carbide graphite treatment transformed type D and E graphite to type A graphite. This innoculation effect from carbide treatment produces graphite structure which results in sounder iron with greatly improved machinability characteristics.

With the injection of one compound, calcium carbide, modern foundries are improving castings, and reducing scrap without changing the base composition of the iron.

It will pay you to further investigate the advantages of calcium carbide injection. The services of Airco Technical men are available to you. They will help you plan and install a calcium carbide injection process tailored to your plant and production requirements. Such installations for carbide treatment can be made completely automatic for any foundry operation. Write to Airco at the address below for complete information.

Airco Fluidizers embody all the latest engineering advances for injecting carbide into molten metal.

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Foundry Group Meetings

Niagara Frontier Conference Program Is Announced

Program for the Niagara Frontier Regional Foundry Conference, to be held at the Statler Hotel, Buffalo, on Thursday and Friday, Oct. 24-25, has been announced. It will include about 15 technical papers.

The conference, the first to be held since 1953, is sponsored by a number of New York, Pennsylvania and Canadian chapters of the American Foundrymen's Society. Buffalo Chapter will be host.

A general session will open the conference Thursday morning. Sectional meetings are scheduled for that afternoon and Friday, with separate sessions devoted to malleable, nonferrous, gray iron, steel, stainless steel, and patternmaking subjects.

Program details follow:

Thursday, Oct. 24

10 a.m.—**Opening Remarks:** Dr. C. C. Furnas, chancellor, University of Buffalo; William W. Maloney, general manager, American Foundrymen's Society; O. Jay Myers, Reichhold Chemicals Inc., White Plains, N. Y., vice president, Region 1, AFS.

10:45 a.m.—**Present Status and Prospects for the Foundry Industry,** William G. Gude, managing editor, FOUNDRY. Presiding, William D. Dunn, Oberdorfer Foundries Inc., Syracuse, N. Y.

12:15 p.m.—**Luncheon: Safety,** W. H. Bleakley, Abco Inc., Erie, Pa.

2:30 p.m.—**Sectional Meetings:**

Malleable Iron: **Fundamentals of Sand Control,** Earl E. Woodliff, sand consultant, Detroit. Presiding, John C. Goetz, Acme Steel & Malleable Iron Works, Buffalo.

Nonferrous: **Metal Mold Reactions in Bronze Alloys,** R. B. Fisher, Ingersoll-Rand Co., Phillipsburg, N. J. Presiding, G. M. Johnston, Neptune Meters Ltd., Toronto, Ont.

Gray Iron: **Development of Pneumatic Sand Reclamation Equipment,** Clifford Wenninger, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago. Presiding, Oscar Pietsch, Pohlman Foundry Co., Buffalo.

Steel: **Steel Castings To Compete with Other Materials,** Clyde B. Jenni, General Steel Castings Corp., Eddystone, Pa. Presiding, Max Ganzauge, General Railway Signal Co., Rochester, N. Y.

Stainless Steel: **Production Problems Encountered in Making Stainless Steel Castings,** E. A. Schoefer, Alloy Casting Institute, Mineola, N. Y. Presiding, George Bott, Welland Electric Steel Foundry Ltd., Welland, Ont.

Pattern: **Pattern Engineering,** Ray Olson, Southern Precision Pattern Works, Birmingham. Presiding, Robert Pugh, Chevrolet Tonawanda Foundry, Tonawanda, N. Y.

6:30 p.m.—**Dinner and Social Evening**

Friday, Oct. 25

10 a.m.—**Sectional Meetings:**

Nonferrous: Speaker and subject to be announced. Presiding, Louis Iannetonio, Oberdorfer Foundries Inc., Syracuse, N. Y.

Gray Iron: **General Cupola Practice,** Willard Adams, International Minerals & Chemical Corp., Chicago. Presiding, A. Edwards, Chevrolet Tonawanda Foundry, Tonawanda, N. Y.

Steel: **Russian Foundry Industry,** A. J. Kiesler, General Electric Corp., Schenectady, N. Y. Presiding, Joseph Sanders, Tonawanda Electric Steel Castings Co., Tonawanda, N. Y.

Malleable Iron: **Stress Analysis Improves Casting Design,** Ross Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Presiding, Elmer Burke, Acme Steel & Malleable Iron Works, Buffalo.

Pattern: **Latest Developments in the Pattern Industry,** Walter Siebert, Standard Pattern Works, Cleveland. Presiding, Ingve Stohle, Symington-Gould Corp., Depew, N. Y.

12:15 p.m.—**Luncheon:** Speaker, Walter B. Mahoney, New York state senator.

2:30 p.m.—**Sectional Meetings:**

Nonferrous: **Gas and Its Control in Aluminum Castings,** Donald La Velle, Kaiser Aluminum & Chemical Sales Inc., Chicago. Presiding, Edward Baker, Federated Metals Division, American Smelting & Refining Co., Rochester, N. Y.

Stainless Steel: **Melting Stainless Steel,** Lou

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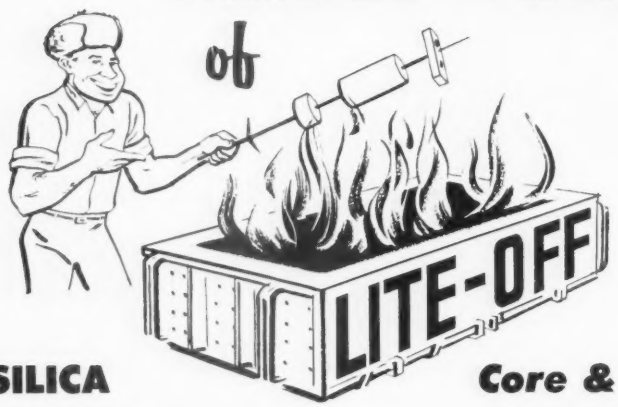

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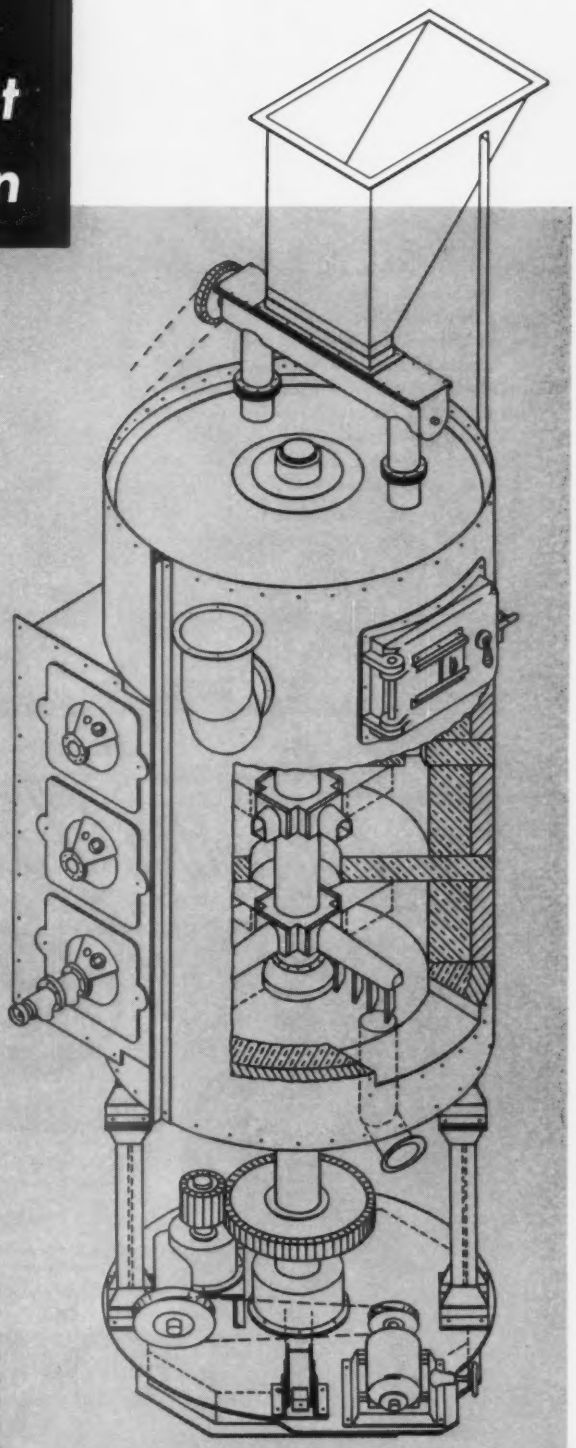

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Circle 728 on Inquiry Card—Page 51

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Circle 729 on Inquiry Card—Page 51

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Circle 730 on Inquiry Card—Page 51

Coshdollar, Pittsburgh Metallurgical Co., Niagara Falls, N. Y. Presiding, Loven Wright, Symington-Gould Corp., Depew, N. Y.

Gray Iron: **Which Core Process?** Anton Dorfmueller Jr., Archer-Daniels-Midland Co., Cleveland. Presiding, Fred Goerke, Standard Buffalo Foundry Co., Buffalo.

Steel: **Core and Molding Sand Additions.** J. A. Gitzen, Delta Oil Products Co., Milwaukee. Presiding, William Stewand, Dominion Foundries & Steel Ltd., Hamilton, Ont.

FEMA Meeting Is Expected To Have Record Attendance

Advance registrations point to a record attendance at the 39th annual meeting of the Foundry Equipment Manufacturers Association. The meeting will be held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 17-19. D. E. Davidson, Link-Belt Co., Chicago, president of the association, will preside.

First-day meetings will center on topics of interest to the various product groups comprising the major components of foundry equipment, including blast cleaning and tumbling, dust and fume control, flasks and accessories, furnaces and accessories, material handling and processing, and molding and coremaking machines.

Principal guest speaker will be Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill., who will discuss "What the Foundry Industry Expects of Equipment Manufacturers."

In the general business sessions, open discussion will be held on problems affecting the industry, business trends in the economy, and the rate of activity in the foundry equipment industry. The FEMA statistical program will be analyzed and interpreted, and the operations of the Washington office will be reviewed.

A panel presentation on "Marketing of Foundry Equipment" will have R. A. Brackett, Spencer Turbine Co., as moderator. Panel members will be C. H. Barnett, Foundry Equipment Co.; J. R. Bloom, Davenport Machine & Foundry Co.; C. G. Hawley, Jeffrey Mfg. Co., and H. E. Helling Jr., Mathews Conveyer Co.

Program Announced For Annual Purdue Casting Conference

Four technical sessions and a banquet are scheduled for the annual Metals Casting Conference to be held at Purdue University, West Lafayette, Ind., Oct. 31 and Nov. 1, under sponsorship of the school and AFS chapters. Conference chairman is Carl Schopp, Link-Belt Co., Indianapolis.

Topics to be discussed include scrap reduction, green sand molding, hot

blast and moisture control, hot tearing, and ductile iron. Program details follow:

Thursday, Oct. 31

9 a.m.—Registration

10 a.m.—Welcome, Dr. Paul Chenea, Engineering Department, Purdue University. Response by L. H. Durdin, president, Dixie Bronze Co., Birmingham, and vice president, AFS. Chairman, Carl Schopp, Link-Belt Co., Indianapolis.

11:15 a.m.—**What We Expect from Our Vendors,** J. I. Miller, Cummins Engine Co., Columbus, Ind. Chairman, J. B. Essex, Golden Foundry Co., Columbus, Ind.

1.30 p.m.—**Practical Scrap Reduction,** Henry Felton, Peoria Malleable Castings Co., Peoria, Ill. Chairman, James Maggart, Sibley Machine & Foundry Co., South Bend, Ind.

3 p.m.—**Modern Green Sand Molding:** Diaphragm Molding, W. Cheek, Central Foundry Division, GMC, Danville, Ill.; Stack Molding, speaker to be announced; Jolt Squeeze Molding, C. H. Lambert, Eberhard Mfg. Co. Division, Eastern Malleable Iron Co., Cleveland; Sandslinger, W. E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind.

6 p.m.—Banquet: **Human Engineering,** H. Heinrichs, Institute of Human Science, Chicago. Toastmaster, R. W. Lindley, Industrial Engineering Department, Purdue University.

Friday, Nov. 1

10 a.m.—**Hot Blast and Moisture Control,** Carl F. Joseph, Central Foundry Division, GMC, Saginaw, Mich. Chairman, Clarence Bowman, Dalton Foundries Inc., Warsaw, Ind.

11:15 a.m.—**Hot Tearing,** Richard W. Heine, associate professor, Metallurgical Engineering Department, University of Wisconsin. Chairman, Harold H. Montgomery, Metallurgy Department, Purdue University.

1:30 p.m.—**Ductile Iron,** speaker to be announced. Chairman, H. B. Voorhees, casting sales representative, Mishawaka, Ind.

3 p.m.—Conference summary: C. T. Marek, Metallurgy Department, Purdue University, and Carl Schopp, conference chairman.

AMHS Elects New Officers

President of the American Material Handling Society for 1957-58 is William E. Kappler, chief conservation engineer, North American Aviation Inc., Los Angeles. Other officers include Frank G. LaTour, Mohasco Industries Inc., Amsterdam, N. Y., first vice president; Alfred J. Benschoten, Manhattan Rubber Division, Raybestos Manhattan Inc., Passaic, N. J., second vice president; Therman O. Darnell, Dow Chemical Co., Madison, Ill., treasurer; and Neil A. Bryson, Canadian Westinghouse Corp., London, Ont., secretary.

Lists Seven Steps to Safety

Seven basic steps to safety are enumerated in a new leaflet published by the National Safety Council, 425 N. Michigan Ave., Chicago. The leaflet, "Seven Steps to Safety," is a digest of a previous NSC booklet, "Plus Costs of Accidents." Safety experts have termed it a "most concise" statement of the principles of industrial safety.

The seven steps include the following: 1. Insist on safety. 2. Assign some one to help on details. 3. Locate trouble spots. 4. Make the job safe. 5. Control unsafe habits. 6. Keep simple records. 7. Get employees into the act.

Single copies of the leaflet may be obtained on request from the Small Business Program of NSC.

Foundries and fabricators are finding the new Cleco 1500 Series Air Grinders ideally suited to snagging and deburring, cleaning up rough castings, removing flash and parting lines and general grinding, sanding and wire-brushing operations. Compare these features with those of other air and electric tools before you buy:

1. **Light weight**—magnesium alloy housing
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4. **Low maintenance** — precision components make the most of trouble-free air-power principle
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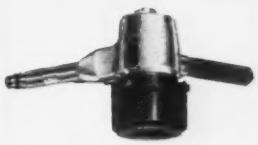

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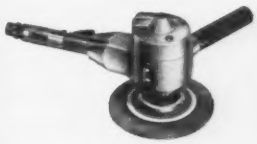

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Circle 731 on Inquiry Card—Page 51

New Books for Foundrymen . . .

Cast Metals Handbook, cloth, 316 pages, 8¼ x 11¼ in., published by the American Foundrymen's Society, Wolf and Golf Roads, Des Plaines, Ill. Price $10.

This fourth edition of *Cast Metals Handbook* in a new size of format has been extensively revised and rearranged to aid the user of castings in selecting the ferrous or nonferrous alloy best suited to the application. While developed primarily for the designer-engineer, others — including foundrymen—will find it a valuable compendium of the latest information on the engineering properties and applications of castings.

The book, divided into six sections, contains 41 chapters. The first section, entitled general, includes ten chapters describing the advantages of castings, properties, casting design, pattern equipment, casting cost, specifications, testing, molding methods, and inspection methods.

Second section, devoted to gray and white cast irons, contains nine chapters providing information on metallurgy, manufacturing methods, properties, classification and specifications, heat treatment, white and chilled iron castings, and applications.

Malleable iron is considered in section three, which contains five chapters on general information, metallurgical reactions, methods of manufacture, properties and pearlitic malleable.

Section four presents pertinent information on nodular iron, while section five concerns steel castings with data on metallurgy, welding, properties, specifications, and some applications.

Final section of eight chapters relates to the various nonferrous alloys, including aluminum-base, copper-base, magnesium-base, lead-base, nickel-base, tin-base, titanium-base, and zinc-base alloys.

The Solidification of Castings, by R. W. Ruddle, cloth, 6 x 9 in., 406 pages, published by The Institute of Metals, 17 Belgrave Square, London, S.W. 1, Eng. Price 42 s.

Revised edition of a book that appeared in 1950. It critically surveys and summarizes the research that has been done on solidification and presents the results in an assimilable form. The book is intended primarily for the research worker and advanced foundry technologist, but much of it is of great interest to the practical foundryman.

Boron, Calcium, Columbium and Zirconium in Iron and Steel by R. A. Grange, F. J. Shortsleeve and D. C. Hilty, W. O. Binder, G. T. Motock and C. M. Offenhauer, cloth, 533 pages, 6 x 9 in., published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y.

Four separate monographs on four of the elements used as alloying metals with iron and steel—boron, calcium, columbium (plus tantalum) and zirconium. The monographs were written by authorities in the field and collect in a single volume all the scattered published and unpublished data on these alloying metals. The book eases the burden of research in discovering what already has been done in a chosen field

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INGOT
Standard For The Industry
For Over Half-A-Century
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Special Alloys
Prompt Delivery
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to prevent duplicating work that might have been reported in other languages or obscure journals.

Management Accounting for Profit Control, by I. Wayne Keller, 435 pages, McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. Price, $7.

One of the publisher's Accounting Series, this book is a practical presentation of management accounting written from the company controller's point of view. It describes coordinated cost accounting and budgetary planning and control procedures used by management accountants to guide management, from foreman to president, in their decision making.

It emphasizes the relationship of the effects of income, cost and capital on profit. Techniques are presented for planning and controlling these three factors, for reporting actuals in comparison with plans and for analyzing the interpreting deviations from the plans. A hypothetical company is used as the background for the entire job.

Design of Die Castings, by Gustav Lieby, 200 pages, published by American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill. Price, $8 ($5.25 to AFS members).

This volume was translated from a German version published in 1949 to provide authoritative information on castings produced by the hot and cold-chamber diecasting processes. Numerical values have been converted from the metric system to the foot-pound system used in the United States.

Contents cover Methods and Processing Principles, Fundamental Features of Diecast Products, Diecasting Materials and Their Application, Suggestions for Die Design and Construction, Dies for Production of Diecast Parts and Obtainable Precision—Determination of Tolerances. A bibliography of references on diecasting and ASTM specifications for diecasting alloys are included. The text is illustrated by 135 figures and 16 tables.

Machine Tools—What They Are and How They Work by Herbert D. Hall and Horace E. Linsley, cloth, 6 x 9 in., 436 pages, published by the Industrial Press, 39 Worth St., New York 13, N. Y. Price $5.50.

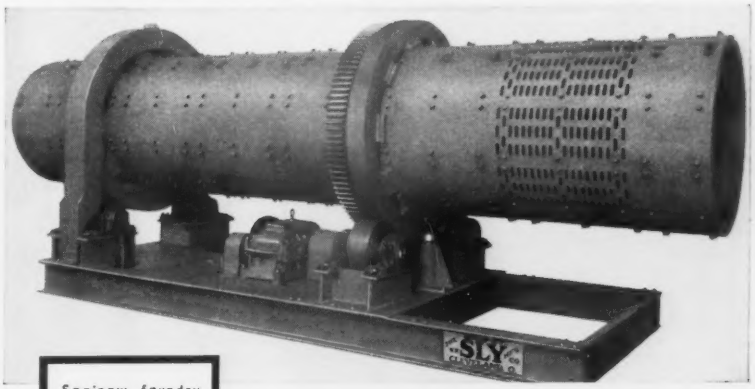
After defining the metalworking industry in terms of its products, this book explains the important factors which make mass production possible; the skills in the machine shop; the kinds of machine tools that are used; the tooling up of machines; gaging and inspection operations; organization for production and the use of time and motion study to further improve efficiency.

It is intended to serve as an aid to students and to give the general reader an intelligent understanding of what machine tools are, what they are used for and with what other metalworking machines they are associated.

Magnesium Casting Technology, by A. W. Brace and F. A. Allen, cloth, 6 x 9 in., 174 pages, published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. Price $4.95.

This monograph is intended to provide foundrymen with an understanding of the basic principles of magnesium founding. It presents objectively both British and American practice against a background of the more basic chemical and physical properties of the metal. Casting alloys, melting practice, molding and core sands, production techniques, permanent mold and die casting, heat treatment, inspection, and surface treatments are covered. A classified bibliography is included.

IN KEEPING WITH FOUNDRY AUTOMATION . . .



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Because of the Sly Continuous Tumbling Mill, cleaning is a constant production flow at a well-known Saginaw, Michigan, foundry. Red-hot malleable iron castings and sprues are conveyed — at the rate of 10 tons per hour — direct from shakeout through the Sly Mill and out in one non-stop operation. The mill *removes fins as it cleans,* saving many hours of grinding time otherwise needed.

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Circle 734 on Inquiry Card—Page 51

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At the advantages of

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- ☐ higher tensile strength
- ☐ greater elongation
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Circle 735 on Inquiry Card—Page 51

The Shakeout

Safety Vehicles Guard Against Emergencies

TWO COMPACT safety service vehicles, equipped with tools to meet emergency fire or rescue situations and to provide civil defense preparations, are in operation at the West Allis, Wis., Works of Allis-Chalmers Mfg. Co. One is designed for emergency rescue operations, the other for fire fighting. Both were designed and built for use within the physical layout of the plant.

Each unit is built on an Allis-Chalmers Choreboy platform truck chassis. The rescue vehicle was constructed in the West Allis Works machine shop maintenance department, and the fire fighting unit was made by SECO Engineering & Mfg. Inc., Detroit, to meet company specifications. Selected personnel on all three shifts of the Plant Protection Department have been training in the use of fire equipment twice weekly for the last several months, and classes with new trainees will go on continuously. Training of maintenance supervisors on all shifts in the use of emergency rescue equipment and first aid also is in progress.

For More Details Circle No. 487—Page 214

Inspection Device Solves Longtime Problem

A NEW inspection device at Gartland Foundry Co., Terre Haute, Ind., is being used to insure proper wall thickness of cast iron protective tubes for thermocouples which sense the temperature of molten aluminum. In the past these tubes have been difficult to produce and next to impossible to inspect for proper wall thickness.

The new inspection equipment utilizes a cobalt 60 source to determine the wall thickness of the tube accurately. It was developed after three years of work by Gartland Foundry and the Brown Instruments Division of Minneapolis-Honeywell Regulator Co., Philadelphia. The only other machine of this type in the country is in Philadelphia, at Brown Instruments Division.

For More Details Circle No. 488—Page 214

Guard Makes Portable Grinders Safer

INCREASED SAFETY in the use of angle portable grinders is reported to have been made possible by a new safety guard insert designed by C. M. Fleming, Raybestos-Manhattan Inc., and developed by Carroll Pressed Metal Inc., Worcester, Mass.

With the new "built-in" guard, the grinding compound is locked in at three points. Because it is completely surrounded on the upper outside diameter, it does not take away any grinding surface in the life of the wheel.

In addition, it is locked in between the extruded prongs and the outside guard and between the prongs and the center nut.

The insert eliminates the need for reinforcing rings, pronged anchor bushings, and individual nuts. It is said to be 25 to 40 per cent safer than separate guards.

For More Details Circle No. 489—Page 214

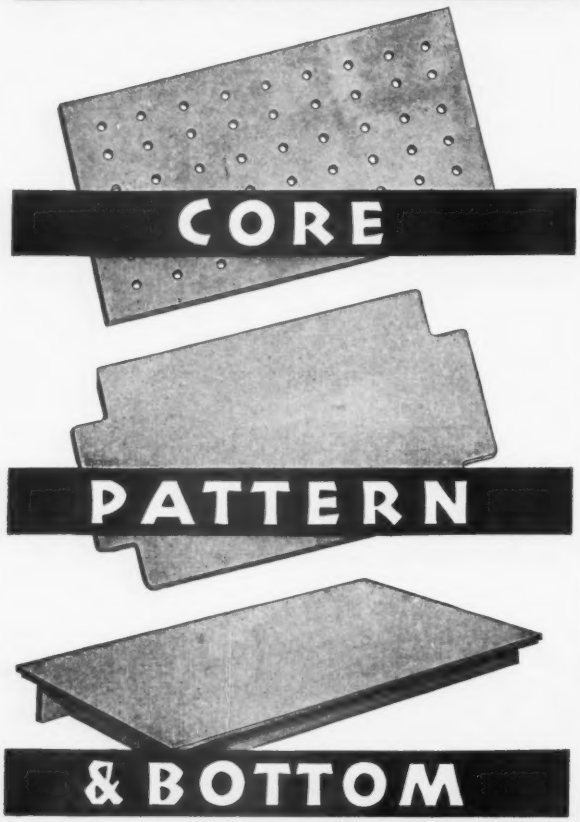
Conveyor Belts Resist Hot Shakeout Sand

MAINTENANCE of conveyors carrying shakeout sand at 300° F from shakeout to storage used to be a costly problem at I-F Mfg. Co., a malleable iron foundry in New Philadelphia, Ohio. These belts had to be replaced every three months, and the cost of shutdowns had to be added to belt costs.

In December, 1955, the company installed two Solarflex hot material belts made by B. F. Goodrich Industrial Products Co., Akron, Ohio. During the more than a year and a half since then, these belts have carried hot shakeout sand for 24 hours a day, five days a week, without a shutdown and with virtually no maintenance, and they are expected to last for several more years. The belts are four-ply, made of a special man-made rubber. They are 330 ft long by 24 in. wide and travel 300 fpm.

For More Details Circle No. 490—Page 214

MOLTRUP



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MOLTRUP

OLIVER 36-in. Band Saw takes 35" under guide to saw large patterns

Don't let size and variety of band saw work slow up your patternmakers! This Oliver handles large patterns smoothly and rapidly. Takes 35" under the guide. Table tilts 45° to right, 7° to left, and is self-locking. Finest demountable ring-disk wheels. Cuts true and steady without vibration at all times. Has motor-on-shaft drive. Write today for Bulletin No. 116-DH.

•

Oliver Band Saws also made with 18", 30" and 38" wheels.

Oliver makes a wide line of woodworking machines for pattern shops including Pattern Lathes and Pattern Millers. Write for details.

OLIVER SINCE 1890

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

Circle 738 on Inquiry Card—Page 51

Faster hardness tests on Heavy Odd-Shaped Castings

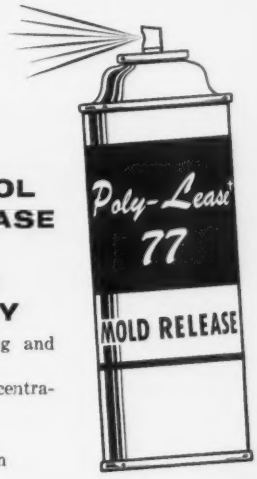
Large cumbersome castings can be tested more accurately with a portable machine. Such parts can be unreasonably expensive to test with heavy stationary equipment. Without elaborate fixturing, parts may drag, leaving an inaccurate oval impression. The King Portable Brinell Hardness Tester saves handling and set up time, permits fast accurate readings, and is so versatile it soon pays for itself many times over. Weighs less than 30 lbs. Write for complete details and specifications.

KING TESTER CORPORATION
DEPT. F 440 N. 13TH ST. PHILADELPHIA 23, PA.

Circle 739 on Inquiry Card—Page 51

Circle 737 on Inquiry Card—Page 51

QUICK & EASY



New AEROSOL MOLD RELEASE & BINDER for POWDER METALLURGY

- Effects rapid wetting and coating of particles
- Effective at low concentrations
- Reduces porosity
- Does not impair grain strength

POLY-LEASE† 77

Polyethylene Mold Release in Aerosol Bomb

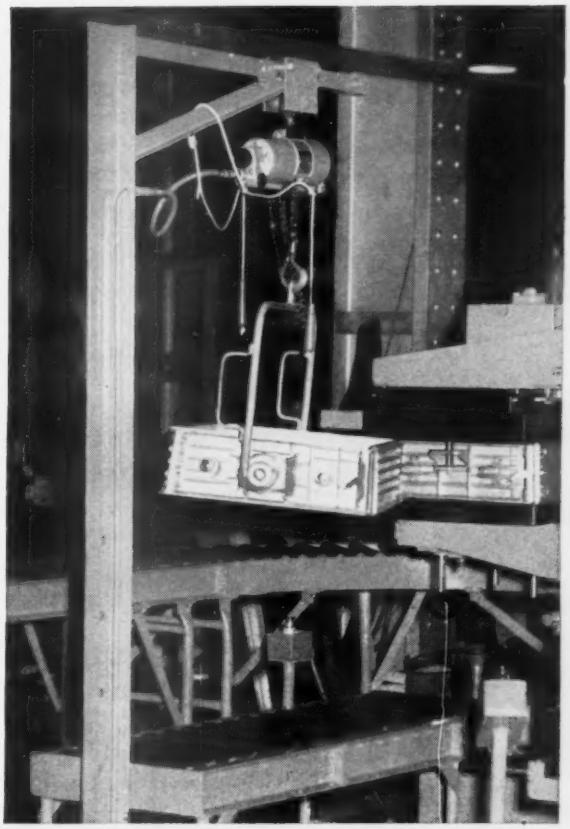
Only **$1.50** per 18 oz. can

ORDER FROM: Thalco, 6431 Flotilla Street, Los Angeles 22, Calif. West Coast Plastics Dist., 8510 Warner Dr., Culver City, Calif. Ren Plastics, 3179 S. Cedar Rd., Lansing, Michigan.

BARRETT DIVISION, Allied Chemical & Dye Corp.,
40 Rector St., New York 6, N. Y.

† Trade Mark of Allied Chemical & Dye Corporation

Circle 740 on Inquiry Card—Page 51



With an unlimited variety of uses, this Keller Tool air hoist speeds production—safely and efficiently.

Here's your "air lift" for 50- to 4000-pound loads

Wherever you have air power, compact Keller Tool air hoists provide a swift, steady lift—with gentle starts and accurate stops—for loads from 50 to 4000 pounds.

Stops and starts—day after day—won't cause motor burnouts that curb production. These hoists are powered by Keller Tool axial piston air motors that *can't burn out.*

Lightweight, relative to their lifting capacities, these handy air hoists are easy to move and install. All sizes are furnished with roller or link chain except 150-pound model, which is equipped with wire cable.

Check the table below for the capacity you need . . . then check with your Gardner-Denver representative or write for Bulletin 86.

Model	Capacity	Speed	Weight
86-2V40	4000 lb.	10 f.p.m.	100 lb.
86-2V20	2000 lb.	19 f.p.m.	78 lb.
86-2V10	1000 lb.	38 f.p.m.	78 lb.
86-1V10	1000 lb.	19 f.p.m.	28 lb.
86-1V5A	500 lb.	38 f.p.m.	28 lb.
86-1V3	300 lb.	80 f.p.m.	28 lb.
86A-1	150 lb.	45 f.p.m.	14 lb.

ENGINEERING FORESIGHT—PROVED ON THE JOB IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

Circle 742 on Inquiry Card—Page 51

FOR AUTOMATIC CIRCUIT-CONTROL

AIRMATIC VALVES

To meet the increasing demand for fully automatic or semi-automatic operations . . . eliminate the need for manual control. Airmatic Valves perform efficiently . . . maintain greater operating speeds. What's more, they are simple and compact in design—assure best arrangement.

A complete line of 2-way, 3-way and 4-way valves available for high-pressure or low-pressure installations.

Three-Way Valve

Solenoid Valves

Cylinders

Write today for complete details about Airmatic Products

Attractive O. E. M. and Quantity Discounts

Delivery from Stock —Immediate

AIRMATIC VALVE INC.
7317 Associate St. Cleveland, Ohio

Circle 741 on Inquiry Card—Page 51

chemicals for the foundry industry

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Circle 743 on Inquiry Card—Page 51

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Moore Lockerbaskets bring you 50% saving in locker room cost, give clothing 100% exposure to moving air and light, provide spacious, open, attractive locker rooms. Clothing locked, tamper-proof, in unused ceiling area. For free design file and booklet, write

THE MOORE COMPANY

DEPT 17, 1036 QUARRIER ST., CHARLESTON, W. VA.

Circle 744 on Inquiry Card—Page 51

Inducto "Push-Out" Furnaces save minutes on every melt

Inducto "Push-Out" furnaces with removable crucibles save valuable minutes in transfer time on every melt . . . meaning extra melts per day . . . thousands of extra castings each year. The moment the charge in one crucible is ready for pouring, the power is immediately transferred to the waiting charge in the other crucible. The crucible of molten metal is raised from the furnace hydraulically so it can easily be transported to the molds.

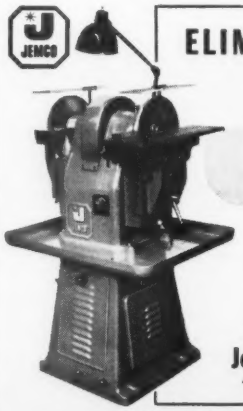
Inducto "Push-Out" furnaces are short and compact, occupying minimum floor space. The operator's controls are mounted on the furnaces for convenience and accessibility. When teamed with Inducto Precision Control, these furnaces offer the ultimate in production melting.

More detailed information may be obtained by writing for Bulletin 70. Write today.

INDUCTOTHERM CORP.

412 Illinois Ave. • Delanco, N. J.

Circle 745 on Inquiry Card—Page 51



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JEMCO

Rotary Disc Filing Machine

Suitable for Steels
Non-Ferrous Metals
Wood and Plastics

Exclusive Territories Open
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Jersey Manufacturing Company

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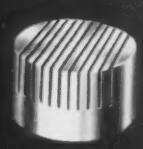
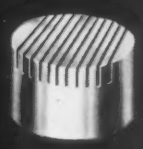
Circle 746 on Inquiry Card—Page 51

SLOTTED CORE BOX VENTS



X-TRA DEEP HEAD .156 Wide Slots .014

SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

Manufactured by C.M. SMILLIE & CO. 1124 WOODWARD HGTS., FERNDALE 20, MICH

INSERTING DRILL

• MOST ECONOMICAL METHOD for INSERTING CORE VENTS
• CORRECT DEPTH
• UNIFORMITY OF HOLES
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VENT CLEANER

• FOR CLEANING SLOTS
• MADE OF TEMPERED STEEL
• EASY TO USE

Circle 747 on Inquiry Card—Page 51

HOW MUCH IS DOWN TIME Costing You?

SWITCH TO

MITCO INDUSTRIALS!

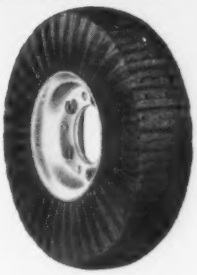
NO FLATS, NO PUNCTURES
NO BLOWOUTS

The premium quality laminated tire. NOW offered as standard or optional equipment by 36 original equipment manufacturers !

Resilient, easy steering Mitco Industrial Tires. **Rugged Performance.** Thrive on hazardous operations and have unequaled carrying capacity.

Extra Traction with gripping tread. **Longer Life**—often 4 times as long.

For Pay Loaders, Fork Trucks, Tractors, Yard Cranes and other Industrial and Agricultural Equipment.



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Circle 748 on Inquiry Card—Page 51

PENN BUCKETS

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

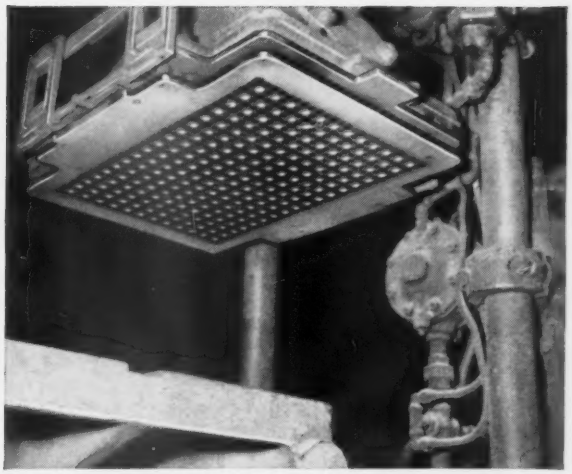
WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

No. 4-A
Self-Dumping

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

PENN IRON WORKS, INC.
READING, PENNA.

Circle 749 on Inquiry Card—Page 51



save up to 70% in core blowing with the *new* McKEE-DODGE UNIVERSAL BLOWPLATE*

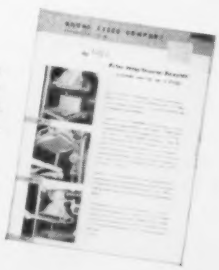
It's a fact! Now you can save time and money in your core operations with this newest Dodge development.

Combining some standard core room practices with new concepts in core blowing, the McKee-Dodge Universal Blowplate offers these plus-value advantages:

- Core rods can be eliminated in most cases.
- Jobs may be transferred from the bench directly to the core blower for increased production.
- Wooden as well as metal boxes can be blown.
- Core blower down time is reduced to a minimum (savings up to 20 minutes in change-over time).

**Patent Pending*

Bulletin FP-855 contains complete details on the McKee-Dodge Universal Blowplate. Write for a free copy.



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DODGE STEEL COMPANY
FINISHED PRODUCTS DIVISION
6501 Tacony Street • Philadelphia 35, Pa.

THE MOST IMPORTANT ALLOY IN A STEEL CASTING IS QUALITY

Circle 750 on Inquiry Card—Page 51

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

Circle 751 on Inquiry Card—Page 51

KEEP WORK AREAS WARM ... improve worker efficiency!

Low cost all-purpose heater for shops, foundries and semi-open areas

Easily Portable.. HOT & CLEAN!

HY-LO Portable Heaters are the answer for permanent or temporary heat. Ideal for hard-to-heat areas—temporary heat in emergencies—any standby or supplementary heating!

WHY HY-LO IS BEST

- Low 1st cost low operating cost.
- 70,000 to 140,000 BTU per hour!
- Burns only ½ to 1 gal. per hr. of low cost fuel oil.
- One filling lasts 10 to 20 hours.
- Exclusive damper for quick extinguishing.
- Carrying handles for easy moving.

Nationally accepted! Produces more heat per dollar invested than any other heater! Write or wire for nearest dealer.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

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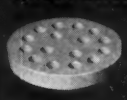
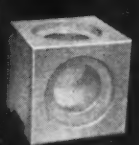
Circle 753 on Inquiry Card—Page 51

FOR BETTER CASTINGS... UNIVERSAL refractory gating components

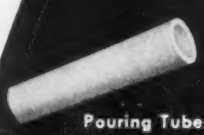
Splash Cores


Strainer Cores



Determine proper gating faster, eliminate slag inclusions, stop rejects, reduce cleaning room time, and lower production costs. UNIVERSAL *refractory* gating components will help you do this, and at less cost than producing your own from sand. Send specifications for price and delivery quotations, or call SAndusky 4631

WRITE TODAY FOR CATALOG LISTING SPECIFICATIONS OF STANDARD GATING COMPONENTS


Pouring Tubes

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Circle 752 on Inquiry Card—Page 51

Complete REPAIR SERVICE on all makes METALLOGRAPHS, MICROSCOPES

Metal Cutting Microtomes
Guaranteed Reconditioned
Buehler Speed Press

MONROE MICROSCOPE SERVICE

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Circle 754 on Inquiry Card—Page 51

HIGH SILICA QUARTZITE PEBBLES

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R. W. SIDLEY, INC.

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Circle 755 on Inquiry Card—Page 51

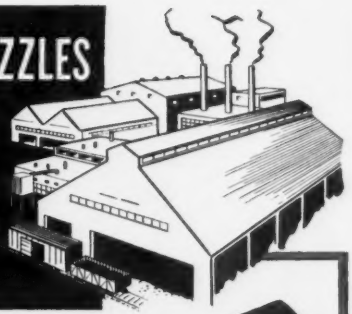
* *
* Idea! *
* *

. . . . . for more information on anything advertised in this issue of FOUNDRY or for extra copies of editorial articles, do this:

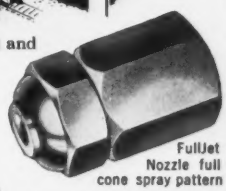
Use handy Inquiry Card in this issue ——— page 51.

SPRAY NOZZLES

to improve general foundry operations and increase product quality



Complete choice of nozzle types and capacities for every foundry need. Typical spray nozzles supplied are:



FullJet Nozzle full cone spray pattern

FOR GAS OR AIR WASHING

Fulljet or Whirljet spray nozzles in any material or capacity to fit your system. Open internal design and large orifices for non-clogging advantages.

FOR AUTOMATIC MOLD LUBRICATION

Pneumatic Atomizing nozzles, pneumatically actuated for required intermittent operation.

automatic Pneumatic Atomizing nozzle

Made by America's leading designers and manufacturers of industrial spray nozzles.

SPRAYING SYSTEMS CO.
3238 RANDOLPH ST., BELLWOOD, ILL.

•

ADVANCE SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

•

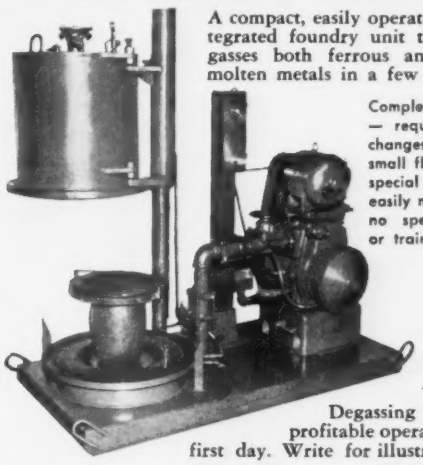
Complete stock of spray nozzles maintained for prompt delivery.

For complete information write for Catalog 24... forty-eight pages of complete nozzle data.

Circle 756 on Inquiry Card—Page 51

REJECTS and SCRAP

due to gas are practically eliminated by . . . **Model 400 VACUUM DEGASSING CHAMBER**



A compact, easily operated, entirely integrated foundry unit thoroughly degasses both ferrous and non-ferrous molten metals in a few minutes.

Complete package unit — requires no process changes — occupies small floor space — no special foundation — easily moved — requires no special experience or training.

Ruggedly built for foundry service.

This Vacuum Degassing Unit permits profitable operation from the first day. Write for illustrated bulletin.

CENTRIFUGAL CASTING MACHINE CO.
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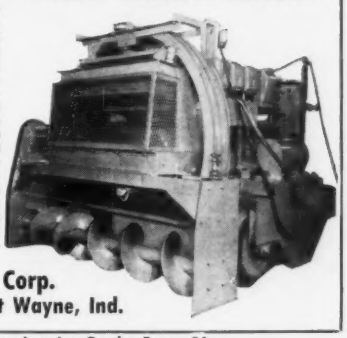
Circle 758 on Inquiry Card—Page 51

REMOTE CONTROL is another feature of the RINGLIFT SAND CONDITIONER!

Operators praise the Ringlift Sand Conditioner because they can stand off to one side and run the machine, watching feed and discharge operations at the same time. Operator does not sit or stand on machine. They like the way the Ringlift picks up shake-out sand, breaks lumps, screens, magnetically separates, adds moisture, mixes, cools, and puts sand back on floor in neat windrows. Eliminates much mulling. Makes ideal facing sand. Send for literature.



States Engineering Corp.
920 W. Berry St., Fort Wayne, Ind.

Circle 757 on Inquiry Card—Page 51

MILWAUKEE-TESCMER

Sprue Cutter

for

Non-Ferrous Foundries

- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
- Built for years of Rugged, Low-Cost Service.
- 2 Sizes, ¾" and 1¼" square. Built-in electric motor or belt drive.

Write for Illustrated Bulletin

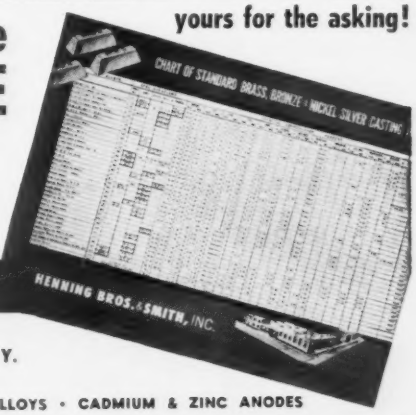
RICE PUMP & MACHINE CO.
222 Park Ave. Belgium, Wis.

Circle 759 on Inquiry Card—Page 51

send for this valuable quick-reference 17" x 22" standard alloy wall chart FREE

yours for the asking!

This see-at-a-glance wall chart will save you hours of time in making up your specs. Chart shows all types of customer specifications: Navy, S.A.E., A.S.T.M., and Federal. It shows chemical composition, by percentages, of 37 alloys. Write today for your copy to:



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ZINC BASE ALLOYS • BRASS, BRONZE & ALUMINUM INGOTS • LEAD & TIN BASE ALLOYS • CADMIUM & ZINC ANODES

Circle 760 on Inquiry Card—Page 51

Perfectly Balanced

VANCORAM GRAPHIDOX NO. 4

to give you a proved, high-potency graphitizing inoculant of superior effectiveness and efficiency

GRAPHIDOX NO. 4...

ELIMINATES harmful porosity resulting from gases in high-strength irons made from charges high in steel scrap

REDUCES chill two to three times as effectively as ferrosilicon

INCREASES tensile strength of high-strength irons with minimum addition

INSURES irons with normal graphite, free from dendritic structure – for maximum strength, wear resistance, freedom from galling

PERMITS reduction in number of irons to be made in jobbing foundries, thereby saving time and money

RENDERS an iron compounded for very heavy sections, suitable for light-section work

. . . and GRAPHIDOX No. 4 is convenient. Add at the spout – or directly in the ladle. It comes in a size convenient for weighing and measuring. Write today for the full story, as told in Vancoram's helpful, free booklet.

Be sure to visit Vancoram Booth #854, Metals Show, Chicago, Illinois, November 4-8

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Producers of alloys, metals and chemicals

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ANNEALING—See FURNACES, (Heat Treating and Annealing)

ANTI-PIPING COMPOUNDS—See RISER COMPOUNDS

ARGON—See GAS

ASSOCIATIONS

Crucible Manufacturers Association, 11 West 42nd St., New York 36, N. Y.
Foundry Educational Foundation, Terminal Tower Bldg., Cleveland 13, Ohio.

BAND SAWS—See SAWS

BANDS (Snap Flask)

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

BARS (Steel)

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, O.

BEARINGS (Anti-Friction, Roller and Ball)

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Timken Roller Bearing Co., Canton 6, O.

BEARINGS (Sintered Bronze)

United States Graphite Co., Saginaw, Mich.

BELTING (Conveyor, Elevator, Power Transmission)

B. F. Goodrich Co., Akron, Ohio.
Great Western Mfg. Co., Leavenworth, Kansas.
Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Quaker Rubber Div., H. K. Porter Co., Tacony & Comly Sts., Philadelphia 24, Pa.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.
United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

BENTONITE

Baroid Division, 332 South Michigan Ave., Chicago 4, Ill.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers Inc., 606 West Michigan, Milwaukee 2, Wis.
Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Magnet Cove Barium Corp., 3403 Buffalo Speedway, Houston, Texas.
Whitehead Bros., 324 West 23rd St., New York 11, N. Y.

BINS (Storage)—See SAND STORAGE BINS and GATES

BLACKING (Mold, Core)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens, Frederic B., Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

BLADES (Shot Blast Equipment)

Pangborn Corp., Hagerstown, Md.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

BLAST CLEANING EQUIPMENT (Airless or Pneumatic)

Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

BLAST CLEANING EQUIPMENT (Hydraulic)

Pangborn Corp., Hagerstown, Md.

BLAST METERS

Foxboro Company, Foxboro, Mass.

BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Campbell-Hausfeld Co., Harrison, O.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio.
Spencer Turbine Co., Hartford, Conn.
Stroman Furnace & Engineering Co., Division of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

BLOWPLATES (Core and Mold)

Dodge Steel Co., 6501 Tacony St., Philadelphia 35, Pa.

BOND CLAY—See CLAY (Bonding)

BOOKS (Technical)

Penton Publishing Co., 1213 West 3rd St., Cleveland 13, O.

BOTTOM PLATES and BOARDS

Adams Co., Dubuque, Iowa.
American Foundry Flask Co., 2745 Southwest Blvd., Kansas City, Mo.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Foundries Materials Co., Coldwater, Mich.
Jo-El Company, Towne & Country Bldg., Cleveland 30, Ohio.
Moltrup Steel Products Co., Beaver Falls, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Westover Corp., 3110 W. Fond du lac Ave., Milwaukee 10, Wis.

BOWLS and SHANKS

Industrial Equipment Co., Minster, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

BOXES (Stacking Tote)

Kirk & Blum Co., 3108 Forrer St., Cincinnati 9, Ohio.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

BRAKES (Magnetic)

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

BRASS AND BRONZE INGOT

Federated Metals Div. of American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co., 11th & State Sts., Chicago Heights, Ill.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

BRINELL TESTING EQUIPMENT

King Tester Corp., 440 North 13th St., Philadelphia, Pa.

BRIQUETS—See Type of Compound

BRUSHES (Bristle)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BRUSHES (Electrical)

U. S. Graphite Co., Saginaw, Mich.

BRUSHES (Wire)

Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.

Erie Strayer Co., Erie, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.
Penn Iron Works, Inc., Reading, Pa.

BUILDING and ENGINEERING SERVICE

American Bridge Div., United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Johnston Mfg. Co., Minneapolis 13, Minn.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland, Ohio.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

BUSHINGS—See FLASK BUSHINGS and PINS

CADMIUM INGOT

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

CAR MOVERS

Frank G. Hough Co., Libertyville, Ill.
Jeffrey Mfg. Co., Columbus 16, Ohio.

CARBON BOOSTER

Carb-Rite Co., 1815 Halsted St., Chicago Heights, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
National Carbon Co., Div. Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

CARBON DIOXIDE—See GAS

CARBON DIOXIDE (Supply and Gassing Systems)

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Pure Carbonic Div., Air Reduction Co., 150 East 42nd St., Socony-Mobil Bldg., New York, N. Y.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTING GRIPS (Air Powered)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Centrifugal)

Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Die)

Cast Master, Inc., 23901 Aurora Rd., Bedford Heights 14, Ohio.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co., Tulsa, Okla.

CASTING SEALER—See IMPREGNATING SYSTEMS

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

CEMENT (Metallic)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Devcon Co., Danvers, Mass.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mullite Refractories, Shelton, Conn.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Chas. Taylor Sons Co., 710 Burns St., Cincinnati 4, Ohio.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Chisholm-Moore Hoist Div., Columbus-McKinnon Chain Corp., Tonawanda, New York.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CHAPLETS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland Chaplet & Mfg. Co., 26470 Lakeland Blvd., Cleveland 23, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
W. L. Jenkins Co., 1445 Whipple Road, Southwest, Canton, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHARCOAL

McDonald Charcoal Co., 1004 Baltimore, Kansas City, 5, Mo.

CHEMICALS

General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Hercules Powder Co., Wilmington 99, Del.
National Carbide Co., 150 East 42nd St., New York, N. Y.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.

CHILLS

Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
W. L. Jenkins Co., 1445 Whipple Road, Southwest, Canton, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 4th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Co., Port Huron, Mich.
Foundry Services, Inc., 200 Bruck St., Columbus 7, Ohio.

CHILL NAILS—See NAILS (chill)

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping) — See PNEUMATIC TOOLS and CHISELS

CHROMIUM (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

CLAMPS (Flask)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.

CLAY (Bonding)

Baroid Division, 332 South Michigan Ave., Chicago 4, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Eastern Clay Products Dept. International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CLAY (Refractory)—See REFRACTORIES

CLEANING—See BLAST CLEANING EQUIPMENT

CLEANING COMPOUNDS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.

CLUTCHES (Magnetic, Friction)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

COATINGS—See CORE and MOLD WASH

COKE (Oven)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

CONVERTER BLOWERS—See BLOWERS

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., 174 Third St., Aurora, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Fabric, Rubber Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
B. F. Goodrich Co., Akron 18, Ohio.
Great Western Mfg. Co., Leavenworth, Kansas.
Imperial Belting Co., 1800 S. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.
United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.
Westover Corp., 3110 W. Fond du lac Ave., Milwaukee 10, Wis.

CONVEYORS (Gravity Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.

CONVEYORS (Mold)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Westover Corp., 3110 W. Fond du lac Ave., Milwaukee 10, Wis.

CONVEYORS (Overhead Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works Inc., Reading, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Richards-Wilcox Mfg., 174 Third St., Aurora, Ill.
Whiting Corp., Harvey, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CONVEYORS (Vibrating, Oscillating)

Ajax Flexible Coupling Co. Westfield, N. Y.
Carrier Conveyor Corp., 211 North Jackson St., Louisville 2, Ky.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

COPPER SHOT

Alloy Metal Products, Inc., Rockingham Rd., Davenport, Iowa
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

CORE BINDERS

Acme Resin Corp., Forest Park, Ill.
American Gum Products Co., P.O. Box 960, Erie, Pa.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 420 Lexington Ave., New York 17, N. Y.
Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carver Foundry Products Co., Muscatine, Iowa.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
E. I. Du Pont de Nemours & Co. Inc., Wilmington 98, Delaware.
Durez Plastics Div., Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept., International Mineral & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Penn-Rilton Co., 324 West 23rd St., New York 11, N. Y.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Robeson Process Co., P.O. Box 960, Erie, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
G. E. Smith, Inc., 246 Washington Rd., Pittsburgh 16, Pa.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Swan-Finch Oil Corp., 5849 West 66th St., Chicago 38, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE BLOWER BUSHINGS

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

CORE BLOWING MACHINES

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., Muscatine, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

COREBOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE DRIERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Sutter Products Co., Hadley & Grant Sts., Holly, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

COREMAKING MACHINES

Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Champion Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
Wadsworth Equipment Co., 2477 Magadore Rd., Akron, Ohio.

CORE OILS—See CORE BINDERS

CORE and MOLD OVENS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland 15, O.

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Foundries Materials Co., Coldwater, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Carl-Mayer Corp., 3030 Euclid Ave.,
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering, Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

CORE PASTE

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)

American Foundry Flask Co., 2745 Southwest Blvd., Kansas City, Mo.
Champion Division, Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Crescent Brass & Pin Co., 5766 Tramrail Ave., Detroit, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Moltrup Steel Products Co., Beaver Falls, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Kane & Roach, Syracuse, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

CORE SAND—See SAND

CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT

CORE STRIPPERS—See CORE DRAWING MACHINES

CORE TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

CORE TRUCKS—See TRUCKS (Core)

CORE VENTS

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M., & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.

CORE and MOLD WASH

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Mullite Refractories, Shelton, Conn.
National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Strainer, Ceramic)

Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Du-Co Ceramics Co. Box 587 Butler, Pa.
Louthan Corp., East Liverpool, Ohio.
Porcelain Products, Inc., Findlay, Ohio.
Universal Clay Products, Sandusky, Ohio.

COUPLINGS (Air, Hydraulic)

Aeroquip Corp., Jackson, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
C. B. Hunt & Sons Inc., Salem, Ohio.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 38, N. Y.

COUPLINGS (Flexible, Shaft)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Modern Equipment Co., Port Washington, Wis.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Self-Propelled)

Austin Western Co., 601 North Farnsworth, Aurora, Ill.
Coles Cranes Inc., Joliet, Ill.
Modern Equipment Co., Port Washington, Wis.

CRUCIBLES

Ajax Electrothermic Corp., Trenton, N. J.
American Refractories & Crucible Corp. 547 Washington Ave. North Haven, Conn.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Crucible Manufacturers Assoc., 11 West 42nd St., New York 36, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Electro Refractories & Abrasives Vars Building Buffalo, New York
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLAS (Hot Blast Equipment)

Modern Equipment Co., Port Washington, Wis.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

CUPOLA LIGHTERS

Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA LININGS—See REFRACTORIES

CUPOLA PATCHING GUNS—See REFRACTORY GUNS

CUTOFF MACHINES (Abrasive)

DoAll Co., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg Co., Div. Turbo Machine Co., Lansdale, Pa.

CUTOFF WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.
Macklin Company, Jackson, Mich.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc. Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

CUTTING OILS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CYLINDERS (Air)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.
Bellows Co., 230 West Market St., Akron 3, Ohio.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Corp., Des Plaines, Ill.
Logansport Machine Co., Inc., Logansport, Indiana.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

CYLINDERS (Hydraulic)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.
Hannifin Corp., Des Plaines, Ill.
Logansport Machine Co., Inc., Logansport, Indiana.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES

DEGASIFIERS and DEOXIDIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Foundry Services, Inc., 200 Bruck St., Columbus, Ohio.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DESIGN TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

DESULPHURIZERS

Carpenter Brothers Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div. Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Modern Equipment Co., Port Washington, Wis.
Olin Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

DRILLS (Pneumatic)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

Gardner-Denver Co., Quincy, Ill.

DRIVERS (Gear, Variable Speed)

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DUMP HOPPERS

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, O.

DUMP TRUCKS

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.

Tractomotive Corp., Deerfield, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.

Barlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Pangborn Corp., Hagerstown, Md.

Peabody Engineering Co., 232 Madison Ave., New York 16, N. Y.

J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

Wheelabrator Corp., Mishawaka, Ind.

ELECTRIC FURNACES (See FURNACES, Electric)

ELECTRODES (Graphic and Amorphous)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.

ELEVATORS (Bucket)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Great Western Mfg. Co., Leavenworth, Kansas.

Jeffrey Mfg. Co., Columbus 16, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Westover Corp. 3110 W. Fond du lac Ave., Milwaukee 10, Wis.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.

Commercial Contracting Corp. 12160 Cloverdale, Detroit, Mich.

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.

Lester B. Knight & Associates, Inc., 549 West Randolph St., Chicago 6, Ill.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Westover Corp., 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FABRICATORS (Metal)

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Modern Equipment Co., Port Washington, Wis.

Newaygo Engineering Co., Newaygo, Mich.

Penn Iron Works, Inc., Reading, Pa.

FACINGS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Delta Oil Products Co., Milwaukee 9, Wis.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.

Penn-Rilton Co., 324 West 23rd St., New York 11, N. Y.

Stevens Inc., Frederic B., Detroit 16, Mich.

Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.

United States Graphite Co., Saginaw, Mich.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

FANS—See DUST COLLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FEEDERS (Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FEEDERS (Rotary)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Fuller Company, Catasauqua, Pa.

Great Western Mfg. Co., Leavenworth, Kansas.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Vibrating)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Carrier Conveyor Corp., 211 North Jackson St., Louisville 2, Ky.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Simplicity Engineering Co., Durand, Mich.

FERROBORON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROCHROME

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

FERROPHOSPHORUS

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

FERROSILICON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Keokuk Electro Metals Co., 320 Concert St., Keokuk, Iowa.

Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

FERROVANADIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILES (Rotary)

Jersey Mfg. Co., 401 Livingston St., Elizabeth, N. J.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

Hannifin Corp. Des Plaines, Ill.

FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES

FLASK BANDS—See BANDS (Snap Flask)

FLASK BUSHINGS, PINS and FITTINGS

Adams Co., Dubuque, Iowa.

American Foundry Flask Co., 2745 Southwest Blvd., Kansas City, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Flask & Equipment Co., Northville, Mich.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.

Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Jeffrey Mfg. Co., Columbus 16, O.

FLASK LIFT MACHINES—See PATTERN DRAW MACHINES

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Newaygo Engineering Co., Newaygo, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Newaygo Engineering Co., Newaygo, Mich.

Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

American Foundry Flask Co., 2745 Southwest Blvd., Kansas City, Mo.

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLOORING (Non-Slip)

Walter Maguire Co., 60 East 42nd St., New York 17, N. Y.
Norton Co., Worcester 6, Mass.

FLUXES

Cleveland Flux Co., 1026 Main St., Cleveland 13, Ohio.
Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FLUXES (Soldering, Welding and Tinning)

Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

FOUNDRY ENGINEERS (See ENGINEERING SERVICE)

FOUNDRY LAYOUT and METHODS (See ENGINEERING SERVICE)

FOUNDRY NAILS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

FURNACE BLOWERS—See BLOWERS

FURNACE LINING—See REFRACTORIES

FURNACES (Air)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Electric Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Inductotherm Corp., 412 Illinois Ave., Delanco, N. J.
International Foundry Supply Co., Water & Spruce Sts., Reading, Pa.
Lectromelt Furnace Co. Div. McGraw Edison Co., P.O. Box 1125, Pittsburgh, Pa.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Swindell-Dressler, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

GAGGERS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Wadsworth Equipment Co., 2477 Magadore Rd., Akron, Ohio.

GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
Pure Carbonic Div., Air Reduction Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

GAS BURNERS—See BURNERS

GENERATORS (Acetylene)

Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

GLOVES—See SAFETY CLOTHING

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

GRAPHITE and GRAPHITE BRIQUETS

Acheson Colloids Co., Port Huron, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Thor Power Tool Co., Aurora, Ill.
U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

GRINDERS (Pneumatic Portable)

Airetool Mfg. Co., Springfield, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.
Master Pneumatic Tool Co., Inc., 13 Krick Rd., Bedford, Ohio
Thor Power Tool Co., Aurora, Ill.

GRINDERS (Surface, Bench, Disc, Floor)

DoAll Co., Inc., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.
Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Thor Power Tool Co., Aurora, Ill.
U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.
U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

GRINDING WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Cincinnati Milling Machine Co., Cincinnati 9, Ohio.
Macklin Co., Jackson, Mich.
Mid West Abrasive Co., Owosso, Mich.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
United States Rubber Co., 4300 New Haven Ave., Fort Wayne 4, Ind.

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephen Mfg. Co., Urbana, O.
Norton Co., Worcester, Mass.

GRINDING WHEEL GUARDS

Carroll Pressed Metal, Inc., 131 Dewey St., Worcester, Mass.

GRINDSTONES—See GRINDING WHEELS

GRIT—See SHOT and GRIT

HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
King Tester Corp., 440 North 13th St., Philadelphia 23, Pa.
Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

HEAT CONTROL AND RECORDING DEVICES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Minneapolis-Honeywell Co. Wayne and Windrim Aves. Philadelphia 44, Pa.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Space, Unit, Oven, Water)

American Air Filter Co. Inc., Louisville 8, Ky.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Scheu Products, Upland, Calif.

HELMETS (Blasting)

American Optical Co., Southbridge, Mass.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Pangborn Corp., Hagerstown, Md.
Wheelabrator Corp., Mishawaka, Ind.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Miller Fluid Power Co., 2040 Nor[illegible] Hawthorne, Melrose Park, Ill.

HOISTS (Chain, Hand)

Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.,
Tonawanda, New York.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
1155 East 283rd St., Wickliffe, O.

Euclid Crane & Hoist Co.,
1365 Chardon Rd.,
Cleveland 17, Ohio.

Harnischfeger Corp.,
4400 W. National Ave.,
Milwaukee 46, Wis.

Manning, Maxwell & Moore, Inc.,
Muskegon, Mich.

Modern Equipment Co.,
Port Washington, Wis.

Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Electric)

Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.,
Tonawanda, New York.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
1155 East 283rd St., Wickliffe, O.

Euclid Crane & Hoist Co.,
1365 Chardon Rd.,
Cleveland 17, Ohio.

Harnischfeger Corp.,
4400 W. National Ave.,
Milwaukee 46, Wis.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Manning, Maxwell & Moore, Inc.,
Muskegon, Mich.

Modern Equipment Co.,
Port Washington, Wis.

Shepard-Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Skip)

Beardsley & Piper Div., Pettibone Mulliken Corp.,
2424 No. Cicero, Chicago 39, Ill.

Gardner-Denver Co., Quincy, Ill.

Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.

Modern Equipment Co.,
Port Washington, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co.,
Newaygo, Mich.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave.,
Passaic, N. J.

Whiting Corporation,
15607 Lathrop Ave., Harvey, Ill.

HOODS (Shakeout, Pouring and Cooling)—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOSE (Air, Blasting, Water, Gas)

Aeroquip Corp., Jackson, Mich.

Gardner-Denver Co., Quincy, Ill.

B. F. Goodrich Co., Akron, Ohio.

Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave.,
Buffalo 5, N. Y.

Ingersoll-Rand Co.,
11 Broadway, New York 4, N. Y.

Pangborn Corp., Hagerstown, Md.

Quaker Rubber Div. H. K. Porter Co., Tacony & Comly Sts., Philadelphia 24, Pa.

Raybestos-Manhattan, Inc.,
Manhattan Rubber Div.,
Passaic, N. J.

HOSE FITTINGS and REELS

Aeroquip Corp., Jackson, Mich.

A. Schrader's Son,
417 Vanderbilt Ave.,
Brooklyn 38, N. Y.

HOT TOP MATERIALS—See RISER COMPOUNDS

HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT

IMPREGNATING SYSTEMS and CASTING SEALER

Imprex Division
Ideal Industries, Inc.
2023 South 60th St.
Milwaukee 14, Wis.

INGOT MOLDS

Acme Foundry Co.,
Detroit 16, Mich.

Great Lakes Carbon Corp.,
579 Fifth Ave.,
New York 36, N. Y.

National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St.,
New York 17, N. Y.

INGOTS—(See type of metal)

INOCULANTS

Carb-Rite Co.
1815 Halsted St.
Chicago Heights, Ill.

Carborundum Co.,
Perth Amboy, N. J.

United States Graphite Co.,
Saginaw, Mich.

INSPECTION EQUIPMENT

Allis-Chalmers,
Milwaukee 1, Wis.

Dietert, Harry W.,
9330 Roselawn Ave.,
Detroit 4, Mich.

Detroit Testing Machine Co.,
9390 Grinnell Ave.,
Detroit 13, Mich.

Eastman Kodak Co.,
Rochester, N. Y.

King Tester Corp.,
440 North 13th St.,
Philadelphia, Pa.

Magnaflux Corp.,
7300 West Lawrence Ave.,
Chicago 31, Ill.

Steel City Testing Machines Inc.,
8817 Lyndon,
Detroit 21, Mich.

IRON ORE

Pickands, Mather & Co.,
Union Commerce Bldg.,
Cleveland 14, O.

IRON OXIDES

Carpenter Brothers, Inc.,
606 West Wisconsin Ave.,
Milwaukee 3, Wis.

Delta Oil Products Co.,
Milwaukee 9, Wis.

Tamms Industries Inc.,
228 No. La Salle St.,
Chicago 1, Ill.

Thiem Products Co.,
9800 West Rogers,
Milwaukee 14, Wis.

JACKETS (Mold)—See MOLD JACKETS

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

Great Western Mfg. Co.,
Leavenworth, Kansas.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Great Western Mfg. Co.,
Leavenworth, Kansas.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Norton Co., Worcester 6, Mass.

LABORATORY EQUIPMENT (Repair)

Monroe Microscope Service,
Post Office Box 656
Rochester 2, N. Y.

LADLES

Industrial Equipment Co.,
Minster, O.

Modern Equipment Co.,
Port Washington, Wis.

Spincraft Inc., 4122 W. State St.,
Milwaukee 8, Wis.

Frederic B. Stevens, Inc.,
Detroit 16, Mich.

Whiting Corp.,
15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS—See REFRACTORIES

LEAD

Federated Metals Div., American Smelting and Refining Co.,
120 Broadway, New York 5.

Benjamin Harris & Co.
11th & State Sts.
Chicago Heights, Ill.

Henning Bros. & Smith Inc.,
91 Scott Ave., Brooklyn, N. Y.

LIFT TRUCKS (See Trucks, Power Lift)

LINSEED OIL

Archer-Daniels-Midland Co.,
Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

Hercules Powder Co.,
Wilmington 99, Del.

LITHIUM

Lithium Corp. of America,
Rand Tower, Minneapolis, Minn.

LOADERS

Clearfield Machine Co.,
Clearfield, Pa.

Modern Equipment Co.,
Port Washington, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Front-End)

Clark Industrial Truck Div.
Clark Equipment Co.,
Battle Creek, Mich.

Frank G. Hough Co.,
703 Sunnyside Ave.,
Libertyville, Ill.

Hyster Co.,
2902 N.E. Clackamas St.,
Portland 8, Oregon.

Tractomotive Corp.,
Deerfield, Ill.

LOCKERS (Clothes)

Moore Co., 1036 Quarrier St.,
Charleston 26, W. Va.

LUBRICANTS (Industrial)

Acheson Colloids Co.,
Port Huron, Mich.

New York & New Jersey Lubricant Co., 292 Madison Ave.,
New York 17, N. Y.

Smith Oil & Refining Co.,
1102 Kilburn Ave.,
Rockford, Ill.

Swan-Finch Oil Corp.,
5849 West 66th St., Chicago 38, Ill.

United States Graphite Co.,
Saginaw, Mich.

LUBRICATING EQUIPMENT

Hannifin Corp,
Des Plaines, Ill.

MACHINE KEYS

Standard Horse Nail Corp.,
New Brighton, Pa.

MAGNESIUM INGOTS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

Federated Metals Division of American Smelting and Refining Co.,
120 Broadway, New York 5, N. Y.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co.,
5400 Dunham Rd.,
Maple Heights, Ohio.

MAGNETIC PARTICLE TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

Ohio Electric Mfg. Co.,
5400 Dunham Rd.,
Maple Heights, Ohio.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

MANGANESE (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.

Whitehead Metal Products,
303 West 10th St.,
New York 6, N. Y.

MATCHPLATE METAL

Federated Metals Division of American Smelting and Refining Co.,
120 Broadway, New York 5, N. Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

Champion Div. Pettibone Mulliken Corp.,
2424 N. Cicero, Chicago 39, Ill.

City Pattern Foundry & Machine Co., 1165 Harper,
Detroit 11, Mich.

Hines Flask Co., 3431 W. 140th St.,
Cleveland 11, Ohio.

Scientific Cast Products Corp.,
1388-92 E. 40th St.,
Cleveland 3, O.

MELTING POTS

Acme Foundry Co.,
Detroit 16, Mich.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc.,
418 N. LaSalle St.,
Chicago 10, Ill.

MIXERS (Core Wash)

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.

MOLD CONVEYORS — See CONVEYORS (Mold)

MOLD DRYERS

Kirk & Blum Mfg. Co.,
3108 Forrer St.,
Cincinnati 9, Ohio.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

MOLD JACKETS

Adams Co., Dubuque, Iowa.

Chicago Mfg. & Distributing Co.,
1928 W. 46th St., Chicago 9, Ill.

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St.,
Cleveland 11, Ohio.

Products Engineering Co.,
Cape Girardeau, Missouri.

MOLD OVENS—See CORE and MOLD OVENS

MOLD SEAL COMPOUND

Whitehead Bros. Co., 224 West 23rd St., New York 11, N. Y.

MOLD WASH—See CORE and MOLD WASH

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Eastern Clay Products Dept. International Minerals & Chemicals Corp., 20 North Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div., Pettibone Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.
Nichols, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

MOLDING SANDS—See SAND

MOLYBDENUM and COMPOUNDS

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.
Fansteel Metallurgical Corp., North Chicago, Ill.

MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Link-Belt Co., Prudential Plaza, Chicago, Ill.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Chill)

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

Alloy Metal Products, Inc., Rockingham Rd., Davenport, Iowa.
International Nickel Co., Inc., 67 Wall St., New York City 5.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

NITROGEN—See GAS

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 121 South Division St., Ann Arbor, Mich.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers, Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Spraying Systems Co., Bellwood, Ill.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

OIL BURNERS —See BURNERS OPEN HEARTH DOORS

Wm. M. Bailey Co., Pittsburgh 16, Pa.

OPTICAL PYROMETERS—See PYROMETERS

OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)

OVENS (Core)—See CORE and MOLD OVENS

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OVENS (Mold Drying)—See CORE and MOLD OVENS

OXYGEN—See GAS

PARTING COMPOUNDS

Acheson Colloids Co., Port Huron, Mich.
Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Dow Corning Corp., Midland, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

PATTERN COMPOUND

Devcon Co., Danvers, Mass.
Tamms Industries Inc., 228 N LaSalle St., Chicago 1, Ill.

PATTERN DRAW MACHINES

The Adams Co., Dubuque, Iowa.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., LaGrange Park, Ill.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

PATTERN SHOP EQUIPMENT

DoAll Co., Des Plaines, Ill.
Oliver Machinery Company, Grand Rapids 2, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Anderson Pattern Inc., Muskegon Heights, Mich.
Automotive Pattern Co., 1884 John R. Street, Detroit 3, Mich.
Champion Div., Pettibone Mulliken Corp. 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Moltrup Steel Products Co., Beaver Falls, Pa.
Pyle Pattern & Mfg. Co., 2636 Sanford St., Muskegon Heights, Mich.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., 320 Concert St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Keokuk Electro Metals Co., 320 Concert St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS

PITCH

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Penn-Rilton Co., 324 West 23rd St., New York 11, N. Y.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS and CHISELS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., 13 Krick Rd., Bedford, Ohio
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.
Thor Power Tool Co., Aurora, Ill.

POURING DEVICES

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS

Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.

PUSH-OFF MACHINES—See PATTERN DRAW MACHINES

PUTTY (Foundry)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

Minneapolis-Honeywell Co. Wayne and Windrim Aves. Philadelphia 44, Pa.

Pyrometer Instrument Co., Bergenfield, N. J.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

RACKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Ajax Electrothermic Corp., Trenton, N. J.

Babcock & Wilcox Co., 161 42nd St., New York 17, N. Y.

Campbell-Hausfeld Co., Harrison, O.

Carborundum Co., Niagara Falls, N. Y.

Carborundum Co., Perth Amboy, N. J.

Carpenter Brothers Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Cedar Heights Clay Co., Oak Hill, Ohio.

Cement Gun Co. 1520 Walnut St. Allentown, Pa.

Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.

General Refractories Co., 1520 Locust St., Philadelphia 2, Pa.

Great Lakes Carbon Co., 579 Fifth Ave., New York 36, N. Y.

A. P. Green Fire Brick Co., Mexico, Missouri.

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Illinois Clay Products Co., Joliet, Ill.

Ironton Fire Brick Co., Ironton, O.

Johns-Manville, 22 East 40th St., New York 16, N. Y.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Mullite Refractories, Shelton, Conn.

National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.

North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.

Norton Co., Worcester 6, Mass.

H. K. Porter Co. Inc., Refractories Div., 2500 First National Bank Bldg., Pittsburgh 22, Pa.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

Chas. Taylor Sons Co., 710 Burns St., Cincinnati 4, Ohio.

United States Graphite Co., Saginaw, Mich.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

REFRACTORY GUNS

Cement Gun Co. 1520 Walnut St. Allentown, Pa.

Eastern Clay Products Dept., International Minerals & Chemicals Corp., 20 N. Wacker Drive, Chicago 6, Ill.

RESIN (Shell Mold)

Acme Resin Corp., Forest Park, Ill.

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

Bakelite Corp., 420 Lexington Ave., New York 17, N. Y.

Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.

General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.

Hercules Powder Co., Wilmington 99, Del.

Plastics Engineering Co., 1607 Geele, Sheboygan, Wis.

Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.

RESPIRATORS

American Optical Co., Southbridge, Mass.

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

RIDDLES (Electric)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Great Western Mfg. Co., Leavenworth, Kansas.

Frederic B. Stevens Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RISER COMPOUNDS

Foundry Services Inc., 2000 Bruck St., Columbus, Ohio.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

U. S. Graphite Co., Saginaw, Mich.

ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY

ROLLER-HEARTH FURNACES — See FURNACES (Heat Treating and Annealing)

RUBBER LINING MATERIAL (Abrasive Resisting)

B. F. Goodrich Co., Akron 18, Ohio.

Pangborn Corp., Hagerstown, Md.

SAFETY EQUIPMENT

American Optical Co., Southbridge, Mass.

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

Pangborn Corp., Hagerstown, Md.

United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

SAND (Core, Molding, Blasting)

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.

Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Northwest Olivine, Inc., 820 First Ave., So., Seattle 4, Wash.

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

Ottawa Silica Co., Ottawa, Ill.

Pangborn Corp., Hagerstown, Md.

Pennsylvania Glass Sand Corp., 140 Stanwix St., Pittsburgh 22, Pa.

Standard Silica Co., Ottawa, Ill.

Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT

SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT

SAND CONTROL and TESTING EQUIPMENT

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Great Western Mfg. Co., Leavenworth, Kans.

Hartley Controls Corp., Neenah, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Madsen Works Baldwin-Lima-Hamilton Corp., E. Rosecrans & Valley View, La Mirada, Calif.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.

Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS—See SAND PREPARATION EQUIPMENT

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Air Filter Co., Louisville 8, Ky.

Baker Perkins Inc., Saginaw, Mich.

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.

Carrier Conveyor Corp., 211 North Jackson St., Louisville 2, Ky.

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.

Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Clearfield Machine Co., Clearfield, Pa.

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Diester Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

B. F. Goodrich Co., Akron 18, Ohio.

Great Western Mfg. Co., Leavenworth, Kansas.

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Moulders Friend, Dallas City, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

Rover Foundry & Machine Co., Kingston, Pa.

Shallway Muller Corp., Hoosick Falls, New York.

Simplicity Engineering Co., Durand, Mich.

States Engineering Corp., 922 W. Berry, Ft. Wayne 2, Ind.

Wheelabrator Corp., Mishawaka, Ind.

SAND RAMMERS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.

Dayton Pneumatic Tool Co., Dayton 1, O.

Ingersoll Rand Co., 11 Broadway, New York 4, N. Y.

Master Pneumatic Tool Co., Inc., 13 Krick Rd., Bedford, Ohio.

SAND RECLAIMERS

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STABILIZER

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

SAND STORAGE BINS and GATES

American Bridge Div., United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Marietta Concrete Corp., Marietta, Ohio.

National Engineering Co., 549 W Washington St., Chicago 6, Ill.

Neff & Fry Co., Camden, Ohio.

Newaygo Engineering Co., Newaygo, Mich.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

Westover Corp., 3110 W. Fond du lac Ave., Milwaukee 10, Wis.

SAWS (Band, Metal, Wood)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

DoAll Co., Des Plaines, Ill.

Oliver Machinery Company, Grand Rapids 2, Mich.

SCALING HAMMERS—See PNEUMATIC TOOLLS and CHISELS

SCRAP (Iron & Steel)

Luria Brothers Philadelphia National Bank Bldg., Philadelphia 7, Pa.

SCREENS (Shakeout and Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Carrier Conveyor Corp., 211 North Jackson St., Louisville 2, Ky.

Diester Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Great Western Mfg. Co., Leavenworth, Kansas.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Simplicity Engineering Co., Durand, Mich.

SEA COAL

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

Penn-Rilton Co., 324 West 23rd St., New York 11, N. Y.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.

Pangborn Corp., Hagerstown, Md.

A Schrader's Son, 470 Vanderbilt Ave., Brooklyn 38, N. Y.

Wheelabrator Corp., Mishawaka, Ind.

SEPARATORS (Magnetic)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Air Filter Co., Louisville 8, Ky.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

The Branford Co., 130 Chestnut St., New Haven 7, Conn.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Rover Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

SHELL MOLDING (Equipment and Accessories)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

C & S Products Co., 18656 Fitzpatrick Ave., Detroit 28, Mich.

Carver Foundry Products, Muscatine, Iowa.

Centrifugal Casting Machine Co., Tulsa, Okla.

Hutchinson Shell Mold Co., Post Office Box 188, Alton, Ill.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

Shaico Engineering Corp., Palo Alto, Calif.

Shallway Muller Corp., Hoosick Falls, New York.

Shell Process Inc., McKinstry Ave., Chicopee, Mass.

Sutter Products Co., Hadley & Grant Sts., Holly, Mich.

SHELL MOLD SAND (Coated)

Acme Resin Corp., Forest Park, Ill.

SHELL MOLDS—See RESIN

SHOT AND GRIT

Abrasive Shot and Grit Company, Springville, New York.

Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.

Carborundum Co., Niagara Falls, N. Y.

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.

Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.

Globe Steel Abrasive Co., Mansfield, Ohio.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.

Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.

National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.

Norton Co., Worcester 6, Mass.

Pangborn Corp., Hagerstown, Md.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Steel Shot Producers, Inc. Butler, Pa.

Wheelabrator Corp., Mishawaka, Ind.

SHOT (Peening)—See SHOT and GRIT

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

SILICA FLOUR

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.

Ottawa Silica Co., Ottawa, Ill.

Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.

Standard Silica Co., Ottawa, Ill.

Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

SILICOMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Pickands-Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SILICON (Briquets)

Electro Metallurgical Co., Div., Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

SILICON CARBIDE (Briquets)

Ohio Ferro Alloys Corp., Canton 9, Ohio.

SILVERY PIG IRON—See PIG IRON (Silvery)

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Tamms Industries Inc., 228 North LaSalle St., Chicago 1, Ill.

SLINGS (Chain)—See CHAIN

SLIP FLASKS—See FLASKS, (Slip)

SLIP JACKETS—See MOLD JACKETS

SMELTERS and REFINERS

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SNAP FLASKS—See FLASKS (Snap)

SODA ASH

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Hercules Powder Co., Wilmington 99, Del.

Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPECTROGRAPHIC ANALYSIS (Equipment and Materials)

Baird-Atomic, Inc. 33 University Rd. Cambridge 38, Mass.

Spectrochemical Laboratories, Inc., P.O. Box 8781, Pittsburgh 20, Pa.

SPRAY GUNS

The Branford Co., 130 Chestnut St., New Haven 7, Conn.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

Rice Pump & Machine Co., Belgium, Wis.

STEEL SHOT—See SHOT and GRIT

STEEL (Structural)

American Bridge Co., Div., United States Steel Corp., 52 S. Wm. Penn Place, Pittsburgh 19, Pa.

STRAINER CORES—See CORES (Strainer, Ceramic)

STRIPPING MACHINES—See PATTERN DRAW MACHINES

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

Minneapolis-Honeywell Co. Wayne and Windrim Aves. Philadelphia 44, Pa.

TENSILE TESTING MACHINES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

Steel City Testing Machines, Inc., 8817 Lyndon, Detroit 21, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

Pyrometer Instrument Co., Bergenfield, N. J.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill

TIMERS (Electric)

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

TIRES (Industrial)

Mitchell Industrial Tire Co., 1400 East 40th St., Chattanooga 7, Tenn.

TONGS

Industrial Equipment Co., Minster, O.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

TORCHES (Gouging and Cutting)—See WELDING, CUTTING and GOUGING APPARATUS

TOTE BOXES—See BOXES (Stacking, Tote)

TRACTORS—See TRUCKS (Utility and Power Lift)

TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

TROLLEYS

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Modern Equipment Co., Port Washington, Wis.

Yale & Towne Mfg. Co. 11000 Roosevelt Blvd. Philadelphia 15, Pa.

TRUCK CRANES

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

TRUCKS (Core)

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Utility and Power Lift)

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.

Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Tractomotive Corp., Deerfield, Ill.

Yale & Towne Mfg. Co. 11000 Roosevelt Blvd. Philadelphia 15, Pa.

TUMBLING BARRELS

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TUMBLING BARRELS (cleaning compounds)

Almco Div. Queen Stove Works, Albert Lea, Minn.

TUNGSTEN

Fansteel Metallurgical Corp., North Chicago, Ill.

TUNGSTEN-NICKEL

Fansteel Metallurgical Corp., North Chicago, Ill.

TURNTABLES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Modern Equipment Co., Port Washington, Wis.

Newaygo Engineering Co., Newaygo, Mich.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNLOADERS (Car)

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

VACUUM DEGASSING EQUIPMENT

Centrifugal Casting Machine Co., Tulsa, Okla.

VALVES (Air, Oil, Water, Steam)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.

North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio.

VALVES (Blow-off and Cut-off)

Bellows Co., 230 West Market St., Akron 3, Ohio.

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.

C. B. Hunt & Sons Inc., Salem, Ohio.

VALVES (Oxygen, Acetylene)

Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

VENTILATING — See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

VENTS (Corebox)

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.

Demmler, Wm., & Bros., Kewanee, Ill.

C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.

Beardsley & Piper., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

The Branford Co., 130 Chestnut St., New Haven 7, Conn.

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

Davenport Machine & Foundry Co., Davenport, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co., Urbana, Ohio.

WASHES—See CORE and MOLD WASH

WEDGES (Foundry)

Adams Co., Dubuque, Iowa.

WELDING APPARATUS (Electric Arc, Inert Gas)

Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.

Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

Miller Electric Mfg. Co., Appleton, Wis.

A. O. Smith Corp., 3533 North 27th St., Milwaukee 1, Wis.

WELDING, CUTTING and GOUGING APPARATUS and SUPPLIES

Arcair Co., 423 South Mt. Pleasant Ave., Lancaster, Ohio.

Hoeganaes Sponge Iron Corp., Riverton, New Jersey.

Linde Co., Div. Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

A. O. Smith Corp., 3533 North 27th St., Milwaukee 1, Wis.

Wilson Welding Co., 221 High St., Altizer Addition, Huntington, W. Va.

WELDING ELECTRODES (Carbon)

United States Graphite Co., Saginaw, Mich.

WELDING GAS—See GAS

WELDING RODS and ELECTRODES

Carborundum Co., Perth Amboy, N. J.

International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Linde Co., Div., Union Carbide Corp. 420 Lexington Ave., New York 17, N. Y.

National Carbon Co., Div. Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.

A. O. Smith Corp., 3533 North 27th St., Milwaukee 1, Wis.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS (Wire Brush)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

WOOD FLOUR

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

WIRE NAILS

Republic Steel Corp., 3100 E. 75th St., Cleveland 27, Ohio.

WIRE ROPE

American Chain & Cable Co., Inc., 271 South Pennsylvania Ave., Wilkes-Barre, Pa.

WOODWORKING MACHINERY

DoAll Company, Des Plaines, Ill.

Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Ansco Co., 171 Clinton St., Binghamton, New York.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

Ray Proof Corp., 843 Canal St., Stamford, Conn.

X-RAY FILM and ACCESSORIES

Ansco Co., 171 Clinton St., Binghamton, New York.

Eastman Kodak Co., Rochester, N. Y.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

ZIRCON SAND

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Berkshire Chemicals, Inc., 420 Lexington Ave., New York 17, N. Y.

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

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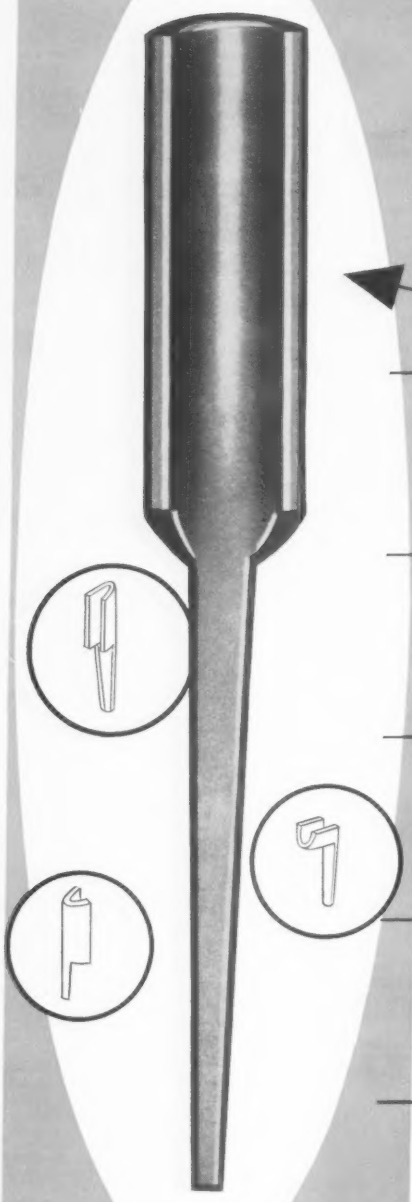

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Circle 764 on Inquiry Card—Page 51

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Circle 765 on Inquiry Card—Page 51

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for
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Mechanical Engineer—with foundry background for production supervision in HEAVY CENTRIFUGAL FOUNDRY, NONFERROUS. Address: Box 746, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Night shakeout foreman for mechanized gray iron jobbing foundry. Ounces to 12 ton capacity. Good job for right man. Address: Box 691, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Foundry in South requires Superintendent with steel and iron background. Technical education desirable. GOOD PLACE FOR YOUNG TO MIDDLE AGED MAN NOW EMPLOYED BUT WHOSE ADVANCEMENT IS BEING DELAYED BECAUSE OF STRONGLY ENTRENCHED HIGHLY QUALIFIED AND HEALTHY SUPERIORS. Only a person with proven ability in the foundry, in handling personnel, production control and training will be considered. Remuneration commensurate with results. Send complete, conservative and restrained resume of qualifications. All negotiations will be in strict confidence.

BOX 733, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For jobbing foundry in New England producing carbon, low alloy and stainless castings. Must have practical and technical background, be cost minded and be able to assume reponsibility. In reply include complete resume giving experience, background, availability, age, salary expected, etc. Address: Box 715, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Foundryman with wide experience and knowledge of gray iron metallurgy and prepared to travel from headquarters in Chicago area. Address: Box 714, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGEMENT ENGINEERING

A position of outstanding interest and diversity for a young foundry engineer to work with leading foundries throughout the U.S.A. Knowledge of gray iron foundry operations and layout work essential. Industrial engineering and costing experience desirable. Address: Box 744, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRY RESEARCH SUPERVISOR

Internationally known research organization has excellent opportunity for an experienced metallurgist to administer the activities of its Foundry Research Section. This individual will direct diversified technical programs as well as maintain close customer contact.

He should have a minimum of a B.S. degree and ten years of diversified research and practical experience. This is a permanent position with an expanding organization offering unusual opportunity for personal and professional development.

Located in Midwestern metropolitan area, we offer a generous relocation allowance along with outstanding vacation, insurance and retirement benefits.

Please send complete resume. All replies will be treated as confidential.

BOX 750, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PLANT MANAGER

Nationally - known Pennsylvania Manufacturer has opening for a Plant Manager to assume complete charge of a large Gray Iron Foundry. Applicants must have proven ability and experience as gray iron foundrymen plus thorough knowledge and experience in supervision and direction of accounting, production control, industrial engineering and industrial relations activities. This is an opportunity for a successful and proven man to make a permanent connection with a large progressive and stable company. Salary $15,000 plus bonus. Please give complete personal data and experience in first reply. All inquiries will be held in strict confidence.

BOX 679, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALES ENGINEER

Foundry selling Large Gray Iron Castings, needs the services of a Sales Engineer who has some college engineering and is capable of reading blueprints. We are looking for a man who is between 25 to 40 years of age and who is willing to work in the Chicago area. You may send your resume to:

HANSELL-ELCOCK CO.,
C. N. OUTMAN
485 WEST 23rd PLACE
CHICAGO 16, ILLINOIS

Telephone contact regarding this position can be made by calling BIshop 7-4321

PERSONNEL DIRECTOR
Foundry Northern Ohio

Fully qualified to assume top level management and labor relations—Approximately 300 employees. Must have proven record. Challenging opportunity. Send resume outlining personal record, previous work record, education background and salary requirement.

BOX 749, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

STEEL CASTING SALES ENGINEER

Challenging opportunity for experienced salesman. Practical foundry and technical background required. Location Northeast. Age range 35 to 45. Salary plus commission, plus expenses. Reply with complete resume. Address: Box 713, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CENTRIFUGAL FOREMAN

Man who can take complete charge of nonferrous centrifugal division in Milwaukee area. Preferably one with following. State age, experience and salary expected. Address: Box 690, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

For modern gray iron foundry in Texas. Good future for right man. In reply please give experience, age and salary range. Replies confidential. Address: Box 723, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. HARRISON 7-8690
JOHN COPE, DIRECTOR 220 SOUTH STATE ST., CHICAGO, ILL.

Help Wanted

ASSISTANT FOUNDRY SUPERINTENDENT

A medium sized company in the East, operating ferrous and nonferrous foundries, requires an assistant to the Foundry Superintendent who is approaching retirement. Experience in both type foundries is desirable, but at least five years' experience in brass pressure type casting essential. Supervisory experience also essential. Submit confidential resume covering education and experience, also salary requirement. Address: Box 700, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY MANAGER

Malleable-Gray Iron-Steel Engineering Graduate

27 years of Foundry Experience

Excellent Work Record

Ability for Drive

Fully Qualified

BOX 737, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRYMAN

College graduate 18 years' experience gray and malleable iron foundries. Well versed in all phases of foundry operations. Will consider employment any location, superintendent level or above. Address: Box 736, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Position wanted in Magnesium Foundry. Excellent production, Zyglo and X-ray records. Extensive background of practical and technical experience. Recognized standing in the industry, presently employed. Inquiries invited. Address: Box 741, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN FOR MELTING

35 years of age. Have had two years' experience in melting and refractories. Wish to advance or better experience. Will accept employment most anywhere in U. S. Married with family. Address: Box 725, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumber supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 705, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

STEEL OR ALLOY FOUNDRYMAN

Forty years' experience, Superintendent, Layout and Planning, Chief Inspector, Trouble Shooter, can lead a team or fit into present organization. Address: Box 726, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGEMENT

Experienced production supervisor in automotive foundry including pouring and finishing operations. Chief inspector in ferrous and nonferrous foundry. Three years' experience in shell molding. Graduate industrial engineer. Address: Box 718, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

ASSISTANT TO GENERAL MANAGER OR OWNER

Want position as assistant or understudy to a successful and progressive executive. Twenty-three years' experience in foundry management, supervision, technology, production. Iron and steel, light and heavy castings, iron and steel roll castings, Hadfield manganese steel castings, Alnico and magnetic materials. Acid and basic arc furnace; acid open hearth, Ajax high frequency, air, cupola furnace castings. Graduate metallurgical and industrial engineer. Age 43. Resume sent on request. Address: Box 717, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MECHANICAL ENGINEER

AGE 35. MARRIED. PRESENTLY IN CHARGE OF METHODS DEPARTMENT, LARGE G.I. FOUNDRY. HAD EXECUTIVE EXPERIENCE MACHINE SHOP, PLUS SALES, PRODUCTION, QUALITY CONTROL IN FOUNDRY. DESIRE POSITION WITH AGGRESSIVE FOUNDRY WHERE EFFORT AND INITIATIVE ARE DESIRED. ADDRESS: BOX 701, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

PATTERN SHOP SUPERVISOR

Twenty-one years' varied experience in large and small job shops, foundry, and corporation shops. Eight years supervision. Interested in pattern engineering. Can furnish evidence of capability; 39, a family man, presently employed, wish to relocate. Address: Box 752, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURING SUPERINTENDENT

With metallurgical background well versed in all phases of gray iron production foundry, cost and quality minded, presently with a leading manufacturer of tractors and farm implements. Seeking similar position with a modern progressive organization. Address: Box 739, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN OR ASSISTANT SUPERINTENDENT

Age 44. Thorough knowledge of all phases of gray iron foundry operations including cupola; 22 years' gray iron foundry experience. 12 years' foundry supervision. References furnished. Address: Box 732, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR DEVELOPMENT ENGINEER

Thirty years' experience in production of steel, gray iron and ductile iron castings. Desire to become associated with progressive organization engaged in the production of any or all above mentioned products. Address: Box 747, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 706, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Thirty years' practical and technical experience, gray iron jobbing and production. Twenty years' supervision. Now employed as superintendent. Age 53. Address: Box 678, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT

Seeks management position with progressive steel or gray iron organization. Familiar with all phases of foundry operations. College graduate. Resume upon request. Address: Box 735, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMANENT MOLD ENGINEER

Graduate Metallurgist with diversified nonferrous experience seeking connection offering responsibility for Aluminum permanent mold design and/or operations. Address: Box 751, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT

Progressive foundry manager. Familiar with every phase of the industry. Background of practical experience on all classes of ferrous and nonferrous work. Address: Box 748, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKS MANAGER OR SUPERINTENDENT

Gray iron, twenty years thorough and practical experience. Mechanized or jobbing. Under 40 years old. Now employed. Address: Box 720, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CORE ROOM FOREMAN

Age 37, 10 years' experience as foreman, medium and heavy jobbing work, iron and steel. Midwest preferred. Address: Box 722, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVE

Selling O.E.M. accounts in New York and New Jersey. Want exclusive line. Technical background. Address: Box 730, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. Address: Box 728, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

SOUND TECHNICAL AND PRACTICAL BACKGROUND IN FERROUS CASTINGS. EXCELLENT SALES AND ADVERTISING MANAGEMENT RECORD. INTERESTED ONLY IN AGGRESSIVE GROWTH COMPANY. DESIRE POSITION AS GENERAL MANAGER OR SALES MANAGER. AGE 40. EMPLOYED. ADDRESS: BOX 704, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

FOUNDERS CORRESPONDENCE SCHOOL OFFERS

A simple complete course in founding stressing the small details, practices and variables involved in the basic operations necessary to the production of quality castings. Ferrous or Nonferrous. Address: Box 702, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultants

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK — 2933 HIGHWAY AVE. HIGHLAND, IND. — PHONE: TEMPLE 8-1244

SCRAP REDUCTION PROGRAM

Ferrous foundry, analyze defective castings, find source of trouble and correct. Mechanized foundry a specialty. Address: S. G. JONES, 2909 W. PROSPECT RD., ASHTABULA, OHIO, PHONE WY 3-0028.

Representatives Wanted

SALES REPRESENTATIVE

Desire former foundry manager, supervisor, or salesman as sales representative for gray iron foundry.

FOUNTAIN FOUNDRY CORP.
VEEDERSBURG, INDIANA

REPRESENTATIVE WANTED

Top ranked national concern needs representatives to sell leading brand Foundry Core Oils, Core Binders, Washes. Exclusive territories open to right men in Western Pennsylvania, Ohio, West Virginia. Must have foundry experience or sales to foundries. High potential earnings, company benefits. Send complete resume. Address: Box 745, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' AGENTS

Manufacturers' agents situated in New York, Pennsylvania and Illinois to represent aluminum permanent mold and sand foundry located in Grand Rapids, Michigan. Agent should have contacts with companies using aluminum castings. Address: Box 734, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVES

Leading investment casting company has $1,000,000 annual open capacity in new plant. Looking for sales engineers on commission basis now carrying allied lines in the following areas: Illinois, Indiana, Wisconsin, Ohio, Eastern upstate New York, New England and Eastern Pennsylvania. Address: Box 721, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVE WANTED

High mechanized malleable and gray iron foundry in Great Lakes District. Interested in commission salesman. Send resume of experience. Address: Box 712, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

FOUNDRY WANTED

GROUP OF FOUNDRY ENGINEERS AND INDEPENDENT MANUFACTURERS WANTS TO PURCHASE LARGE FOUNDRY OR SEVERAL SMALL FOUNDRIES (FERROUS AND NONFERROUS) WITH OR WITHOUT PROPERTY. MUST HAVE OWNERSHIP BEFORE JANUARY 1ST, 1958. PLEASE SUBMIT COMPLETE DETAILS AS TO CAPACITY, TYPE OF PRODUCTION, FOUNDRY EQUIPMENT, FLASK INVENTORY AND TRANSPORTATION FACILITIES.

PRINCIPALS ONLY
ALL REPLIES CONFIDENTIAL
BOX 742, FOUNDRY
PENTON BLDG. — CLEVELAND 13, OHIO

WANTED FOUNDRY EQUIPMENT

Foundry investment organization needs used foundry equipment to activate and mechanize a large foundry. Complete foundry without property will be considered. Please furnish complete information regarding age, condition, price, and when inspection can be made.

BOX 743, FOUNDRY
PENTON BLDG. — CLEVELAND 13, OHIO

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY FOR SALE

Fully equipped gray iron foundry, 17,000 square feet, ideally located in New York Metropolitan area, 2 acres land and R.R. siding. Fully equipped—16 ton cupola, American Wheelabrator, core ovens, jolt squeezers, etc., etc.

WRITE OR PHONE:

J. J. MESSER
6 EAST 39TH STREET
NEW YORK 16, N. Y.
MUrray Hill 9-5765

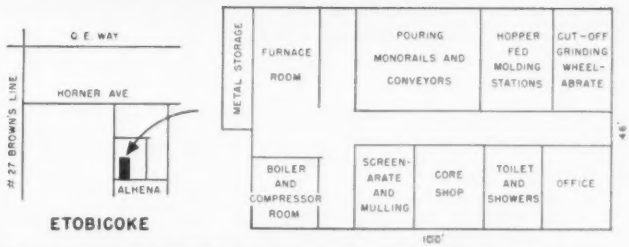
FOUNDRY FOR LEASE

Foundry and machine shop at Grand Junction, Colorado, in the heart of the uranium industry. Would consider lease to reliable parties. Address: HAYDEN TWIST DRILL CO., MANILA, ARKANSAS.

Modern Non-Ferrous Foundry

FOR SALE

CAPACITY OF 40,000 LBS. FINISHED CASTINGS PER MONTH



On one acre of excellent land in a popular industrial area. This building, enclosing 5000 square feet, contains a clean, well-mechanized foundry with a single shift capacity of 40,000 lbs. of finished castings per month. This unusual opportunity is offered because of owners announced plans to greatly expand and integrate its Toronto operations. For further information, call or write.

BURNDY CANADA LTD.
1530 Birchmount Rd. Metropolitan Toronto, Scarboro, Ont. Can.
Mr. McLenaghan. Telephone: PL 7-8761

★

AIR COMPRESSORS

SCHRAMM—5¾" x 5", 180 CFM, 25 HP
PENNSYLVANIA—12" x 10", 300 CFM, 60 HP
INGERSOLL RAND—12" x 10", 290 CFM, 50 HP
SULLIVAN L-HEAD—14" x 8¾" x 10", 400 CFM, 75 HP
INGERSOLL RAND—10" x 14" x 17", 550 CFM, 100 HP
SULLIVAN L-HEAD—Synchronous, 600 CFM, 125 HP
CHICAGO PNEUMATIC—17" x 10" x 12", 630 CFM, 130 HP
CHICAGO PNEUMATIC—Synchronous, 730 CFM, 150 HP
BURY—17" x 10" x 14", 730 CFM, 150 HP

BLAST CLEANING EQUIPMENT

15" CONTINUOUS TUMBLAST 4 Tons/hr.
36" CONTINUOUS TUMBLAST 15 Tons/hr.
48" x 48" TUMBLAST WITH SKIP LOADER
48" x 42" TUMBLAST WITH SKIP LOADER
36" x 42" TUMBLAST WITH SKIP LOADER
NO. 1 MULTIPLE TABLAST
36" x 36" x 72" WHITING TUMBLING MILL WITH DRIVE
42" x 42" x 72" WHITING TUMBLING MILL WITH DRIVE
36" x 72" WHITING TUMBLING MILL WITH DRIVE
AMERICAN AIRBLAST PRESSURE CABINET, MODEL 4K

ROTOCLONES

AMERICAN 20D ROTOCLONE WITH HOPPER TYPE F
AMERICAN TYPE 24W ROTOCLONE WITH PRECLEANER
AMERICAN TYPE 30W ROTOCLONE WITH SLUDGE EJECTOR
AMERICAN TYPE N ROTOCLONE 30,000 CFM
AMERICAN TYPE N ROTOCLONE 24,000 CFM
AMERICAN TYPE N ROTOCLONE 22,000 CFM

JOLT SQUEEZERS

275J OSBORN WITH SHELL MOLD ATTACHMENT
110J SPO

JOLT SQUEEZE PIN LIFT

7012J OSBORN PLATE 20" x 24", DRAW 6"
710J OSBORN PLATE 16" x 28", DRAW 6"
712J OSBORN PLATE 18" x 24", DRAW 6"

ROLLOVERS

1500# HERMAN HIGH SPEED 30" x 48", TABLE
3000# HERMAN 40" x 58", TABLE
10000# HERMAN 60" x 84", TABLE
800# OSBORN 16" x 22", TABLE, MODEL 2047
3000# TABOR 40" x 54", TABLE
4000# TABOR 42" x 60", TABLE

CORE ROLLOVERS

CHAMPION—TYPE W, 22" x 8" DRAW
CHAMPION—TYPE W, 22" x 12" DRAW
DEMMLER—MODEL 2P, CORE BOX 20" wide x 13" DRAW

AUTOMATIC SHELL MOLD MACHINES

TYPE SU-1, PLATE 26" x 42", GAS FIRED
SUTTER, SP1100, PLATE 26" x 41", GAS FIRED

Partial Listing

CALL US COLLECT

FOR YOUR REQUIREMENTS

WHITEHEAD
EQUIPMENT CORP.

P.O. Box 939 READING, PA.

PHONE: FRanklin 5-4379

Circle 872 on Inquiry Card—Page 51

For Sale

FOR SALE

TABOR, jar rollover, power draw, table 22x42, 600 lb. cap.
OSBORN, jolt rollover, table 30x40
J&J, #918, rollover, with rollout table
INT., rollover, 30x8, portable
INT., rollover, 24x10, portable
INT., rollover, 30x8, portable, no jolt
DAVENPORT, #28SA, jolt rollover
J & J, rollover 24x30
10—OSBORN 275J, Squeezers, portable
2—OSBORN 275J, Squeezers, Stationary
2—CHAMPION Model JS-10S Jolt Squeezers
2—MILWAUKEE Squeezers, Stationary
2—INTERNATIONAL Squeezers, Portable
6—ARCADE Model 100S Jolt Squeezers, Stat.
HERMAN Jolt Stripper, 48x54
INTERNATIONAL Plain Jolt, 36x45 Table
NICHOLS Plain Molding Machine, High Speed
OSBORN #7012, Portable Jolt Squeezer, pin lift, 20x22
SPO Model 506 SP-2, Jolt rollover, Pattern Draw, Pin Lift, 22x26 table
3—INT. TYPE R, Core Maker Rollovers, Hand
INTERNATIONAL Core Blower SB 13
INTERNATIONAL Core Blower SB 11
CHAMPION Core Blower CB 18
DEMMLER Core Blower Style 1
DEMMLER Core Blower Style 2
PORBECK Core Oven Drawer Type
3—COLEMAN Core Ovens Drawer Type
CLIMAX Wire Straightener No. 2
ROYER Screenarators
SIMPLICITY Screenarators
SAND MIXERS, paddle type
GRINDERS, 1 hp. to 25 hp.
DISC GRINDERS
POURING DEVICES & DISTRIBUTORS
LADLES ALL TYPES 50 lb. to 5000 lb.
GYRATORY RIDDLES, 20" to 24"
MONORAIL & BRIDGES
AIR HOISTS, 500 lb. to 4000 lb.
OVERHEAD CHAIN CONVEYOR, #458 and DRIVES
BLOWERS, ALL SIZES, CENTRIFUGAL & POSITIVE
DUST COLLECTORS, ALL SIZES
TRANSITE CORE PLATES, ALL SIZES
FLASKS—THOUSANDS IN STOCK—ALL SIZES STEEL—ALUMINUM—JACKETS

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE
HOMAN MACHINERY COMPANY
710 E. FRONT ST.
CINCINNATI, OHIO
MAin 1-0339

SAND BLAST EQUIPMENT
SELL—BUY—TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

9' LG-14 Pangborn Table	$4500.00
6' LE Pangborn Air Table	800.00
Pangborn 53 EN2 Hand Cabinet	325.00
Panborn Auto Peening Cabinet	1100.00
48 x 48 Wheelabrator Tumblast	5000.00
42 x 48 Wheelabrator Tumblast	1500.00
36 x 42 Wheelabrator Tumblast	2000.00
27 x 36 Wheelabrator Tumblast	2750.00
15" Continuous Wheelabrator Tumblast	2000.00
8' Wheelabrator Table Blast	2000.00
6' Wheelabrator Table Blast	3000.00
4' Wheelabrator Table Blast	2500.00
Vapor Blast Cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
VI-36750
We Will Buy one piece or your entire plant.

FOR SALE

1—Coleman, external recirculating mold or core drying batch oven. Outside dimensions: 16'4" wide x 20'8" long x 10'6" high, exclusive of recirculation furnace.

Door opening one end, 14'0" wide x 9'6" high. Rockwool insulation in walls, roof and door complete with:

1—motor driven car, 12'0" wide x 18'0" long. External recirculation system located on top of oven.
1—Clarage recirculating fan.
1—Clarage exhaust fan.

Gas fired with automatic temperature controls with safety equipment. Price $4800.00 f.o.b. Milwaukee, Wisconsin.

CRUCIBLE STEEL CASTING COMPANY
2859 SOUTH 20TH STREET
MILWAUKEE 15, WISCONSIN

FOR SALE

Roots-Connersville Cupola Blower #7, 10,000-12,500 CFM with or without 100 HP Westinghouse Motor. Condition Excellent. Address: BOX 181, BRIGHTON STATION, ROCHESTER, NEW YORK.

For Sale

POWER EQUIPMENT CO.
OFFERS
BARGAIN PRICES
ON GUARANTEED
NEVER USED AND REBUILT
MOTORS!

OCTOBER SPECIALS
REBUILT MOTORS

HP	Make	Type	Speed
300	West. Open S.B.	CS-1002	600
125	West. Open B.B.	CS-7616	1800
100	Howell Open B.B.	NC-684	900

Send for our FREE Catalog

Cash for your surplus new & used electric equipment
Send your list today.

Large line of motors, control equipment, AC & DC Generators, MG sets and transformers.

Phone GEnesee 8-5629

POWER EQUIPMENT CO.
8 Cairn St., Rochester 2, N. Y.
Phone GEnesee 8-5629

FOR SALE

5—Simpson #0 Mullers—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer. Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models: 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U.S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

MOTORS—GENERATORS
TRANSFORMERS
Unused —Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

FOR SALE

20 KW Ajax convertor with 2 power factor correction capacitors. One 17# melting furnace and mercury table. Asking $2500.00.

CONNECTICUT INVESTMENT CASTING CORP.
ISLAND ROAD
STONINGTON, CONNECTICUT

BLOWERS FOR SALE
Spencer—No. Amer.—Stroman

Capacities from 60 to 4500 CFM at 2, 12, 16 and 24 ounces.
Motors for 110/60, 220/440/3/25 and 60 cycle and 230 volt DC.
Let us quote on your requirements!

R. C. CHELIUS
31 PALMER AVE.
KENMORE, BUFFALO 17, N. Y.

COMPRESSOR FOR SALE

Ingersoll-Rand Air Compressor, capacity 516 cu. ft., 125 H.P. Westinghouse Synchronous motor, 2200 volt, 3 phase, 25 cycle with control panel, separate excitor and transformers.
Also 48 x 48 Wheelabrator Tumblast and loader.

LAKE ERIE FOUNDRY COMPANY
143 FILLMORE AVENUE
BUFFALO 10, NEW YORK

FOR SALE

2—HUTCHINSON SHELL MOLDERS—Model 1424, slightly used, in excellent condition.
2—REDA FURNACES—Model 1000, one never used, one slightly used, in excellent condition.

MC BRIDE & SHOFF, INC.
METAMORA, ILLINOIS

For Sale

FOR SALE

3—SPO #113 J Molding Machines—18½" x 26" table

1—B & P Speed Draw—7500# capacity—table up to 60 x 60 flask. New 1955—Hardly used

1—B & P Speedmullor New 1948—air cooled—Cutler-Hammer compensator. A-1 Condition

1—B & P Stationary Slinger installation, 19" head, 210 cu. ft. National Rotary plate feeder, 4' x 10'—Simplicity shaker screen, flat belt conveyor with magnetic separator—Condition excellent

4—Super Handy Sandy units—Model SHS-7-G—Capacity 35 TPH—New 1956. Used 3 Months

1—Syntron F45 Vibra Flow feeder—100 TPH

1—National troughing belt conveyor—36" wide x 43'-7" with 24" belt

1—Standard Electrical Tool #33VL variable speed snagging grinder for 30 x 3 x 12 wheel—New 1957

1—Foxboro airweight control—Model 10

1—48" Cutler-Hammer magnet—Not used since being re-wound

1—55" Cutler-Hammer magnet

1—Redford #4 core blower with side clamps. New 1954.

1—Rebuilt Clark Electric carloader—6000# with charger

1—18" Whitcomb lathe with Lima drive

93—Stock size hardwood patterns—will make rounds and squares up to 8" x 10" x 48" and 12½" dia. x 9" lg.

1—P & H 5-Ton two motor overhead traveling crane trolley—with new spare motors 20 HP & 3 HP together with cab and control panel—All new 1955

1-Lot Squeezer flasks & jackets up to 18" x 18" also side & center floor steel and cast flasks

MARION MACHINE FOUNDRY, INC.
P.O. BOX 989
MARION, IND.
PHONE 412

FOR SALE

#2A Climax Wire Straightener, including speed reducing unit sheaves and V-belts and a 1 H.P. motor, but less motor, wiring and electrical equipment. Like new—$600.00.

Globe Producting Lift—4000# load on 122 p.s.i., speed of rise approx. 9 FPM. Electric motor pump unit is an integral part. Never used—$1,380.00

NATIONAL-U. S. RADIATOR CORPORATION
P.O. BOX 711
NEW CASTLE, PENNSYLVANIA

For Sale

FOR SALE

4 x 6 Allis Chalmers Vibrating Shake-Out. New 1948, very good condition. Complete. Immediate availability.

BOX 731, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ELECTRIC ARC FURNACES
FOR SALE

Two 1-ton side charging furnaces completely ready to operate. 1 with 500 k.w. and other 350 k.w. transformer. Exceptionally low priced for quick sale.

FRED H. WUETIG & ASSOCIATES
7445 SO. CHICAGO AVE. CHICAGO 19, ILL.
PHONE: HYDE PARK 3-7470

FOR SALE

1 used #7 Roots Connersville Blower 10,000 CFM capacity, V-belt driven by 100 H.P. Westinghouse 3 phase, 60 cycle, 220/440 volt motor with manually operated variable speed controls. Excellent operating condition.

BOX 716, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

Complete Palmer-Bee conveyor system. Has one 180° turn with variable-speed drive unit, one 180° turn with take-up unit, two 180° turns with idlers, six 90° turns with idlers, 450' of track, chain and 95 carriers, each suitable for holding two 15" x 20" shell molds. Equipment has had little use and is in excellent condition. Priced reasonably. Address: CARLSON PATTERN SHOP, INC., 616 BERKSHIRE AVE., SPRINGFIELD 9, MASSACHUSETTS.

MOLDING MACHINE

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston)

CHARLIE AMMEN'S NONFERROUS RECIPES

A collection of Patinas, washes, binders, sand, core, metal mixes and assorted dope. $7.00. Address: C. W. AMMEN, 8126 UTAH ST., OAKLAND, CALIFORNIA.

FOR SALE

New spare parts for Pangborn Twin and Roto Blast Machine. Address: WEISSBUCH STEEL SUPPLY CO., P.O. BOX 629, GARY, INDIANA.

For Sale

FOR SALE
#2 SIMPSON MIXER—LOADER. USED ONLY TWO YEARS. NEW GUARANTEE. LESS THAN HALF COST.

Carl Mayer Core Oven—48" wide, 32" deep; 51" high $250.00
Aluminum Melting Furnaces Hant Tilting; 400# cap ..... ea. 250.00
500# Aluminum Holding Furnaces ea. 250.00
Model SB-11 International Core Blower .. 350.00

MOLDING MACHINES

213 SPO 4½" jolt; 13" squeeze
2114 SPO—11" sq.
2136 SPO—13" sq.
720 U Osborn—11" sq.
Tabor 30" x 40"; 12" draw; shockless 1000#
2047 Osborn—18" x 24"; stationary
601—602—605 Osborns
275J Osborn Squeezers
216-6 Milwaukee Jolt Squeeze Draw Machine 2000# jolt; 12" draw; 31" table

CORE BLOWERS

Redford—Bench Type
#193 and #94 Osborn

FURNACES

2000 lb. Stroman—Tilting Hydraulic Aluminum Melting
2000 lb. Fisher—Aluminum
350 lb. Detroit Rocker Barrel
Stroman Reverberating 300# Aluminum; 900# Brass Cap.

CORE OVENS

Dielectric—Model 900A and 1800A

MISCELLANEOUS

Model S. Screenarators—B & P
#42 Osborn Hand Rollovers
Simpson Labratory Mixer
Charging unit for open hearth

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152nd STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

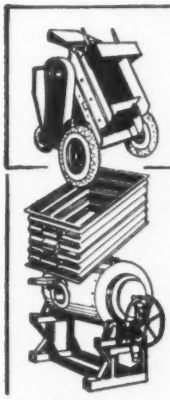
REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO

OSBORN ROLLOVERS:

5—405, 18" to 26" draw, air clamps, 3500# capacity

TUMBLING MILLS:

1—60" x 72" Ransohoff wet type 220/440/3/60
1—36" x 54" Royersford, belt driven
2—32" x 68" & 50" x 80" Sly

WHEELABRATORS

1—20" x 27" 2 cu. ft.
1—8' Multi-table with dust collector

MULLERS

1—610 Clearfield 14 cu ft. capacity
2—3 Simpson 30 cu ft. capacity

SWING GRINDERS

10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:

1—80 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS

1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
1—AMERICAN WHEELABRATOR TUMBLAST, 36" x 42", w/loader & dust collector, Very Late Model
1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capacity
1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 42"
10—WHITING 36" x 36" x 72" w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round

CONVEYORS

1—JEFFERY, 3 compartment, ingot mold
1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS

1—CHAMPION CB-12
12—DEMMLER #1, #2, #2A, #2K, #3K, #4E
3—INTERNATIONAL SB-13
4—OSBORN, #91, #92, #192, #91-10
1—RANDALL, Model "A", Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS

1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
1—TABOR Cupolette, 48" dia. 9" cap.
1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control
1—WHITING #7 w/Skip Charger, Blower, and Foxboro Control

DUST COLLECTORS

1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
9—ROTOCLONE #12 Type N, #14D, #16W, #20D, Type W 30"

FLASKS

150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets
CHERRY WOOD Snap Flasks

200 TRANSITE CORE PLATES, Various sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING

1—250 Lb. LECTROMELT, Side Charge
1—3,000 #/hr. LECTROMELT

FURNACES—INDUCTION MELTING

1—1 ton AJAX
1—3 KW, AJAX, Lab type
1—20 KW, AJAX SPARK GAP, High Frequency
1—20 KW AJAX, 50# capacity
1—40 KW AJAX Spark Gap
1—60 KW, 3000 Cycle
1—200 KW AJAX
1—333 KW AJAX 1000#
3—SPO #305, #307, 750 lb., 1500 lb.

IMMEDIATE DELIVERY

3 Ton Top Charge

SWINDELL ARC FURNACE

Unit is in Excellent Condition, Dismantled, ready for Immediate Delivery.

FURNACES—GAS & OIL

1—FISHER MNP, Gas, Tilting, 1700# cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500# cap.
1—HAUSFELD, Tilting, 1200# capacity
1—STROMAN, Gas, Tilting, 1000# cap. Alum., auto control hyd. lift
1—REDA 550#. Never Used

GRINDERS

1—CINCINNATI, 5 HP, 2/60/110
1—GARDNER 12" x 2½" wheels, 5 HP
1—MUMMERT DIXON, 16" x 2" wheels, 7½ HP
4—22" wheels, 10 or 15 HP
1—HISEY WOLF, Model 4, 16" x 2" wheels, 7½ HP
3—U.S. Model 64, 14" x 2" wheels, 5 HP
1—U.S. Model 66, 14" x 3" wheels, 7½ HP
1—U.S. Model 65, 20" x 3" wheels, 10 HP Swing Frame

MOLDING MACHINES

Jolt Rollover Pattern Draw

1—J & J #610 RP, 24" x 30" Table, 600#
1—J & J #1020, 50" x 60" Table, 3,000#
2—J & J #918, 44 x 54 Table, 20" draw
2—J & J #815, 30" x 40", 15" draw, 1200# jolt
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 50" x 72"
1—HERMAN 3000#, 30" x 66" Table
2—HERMAN 1500#
1—HERMAN 750#, 30" x 36"
2—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 50", 18" draw
3—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
1—TABOR, 30" x 40" w/air clamps, 1000#
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000#
1—TABOR, 14" x 16" Rockover

Bumpers

5—DAVENPORT, Table sizes 24" x 27", 30" x 30"
1—OSBORN #102
1—SPO #58P, 18" x 28" table, 800#

Jolt Pin Lift

1—HERMAN, 22" x 30" table, #4317
1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" table, 600#
1—30 KW LEPEL, 17 lb.

Jolt Squeeze Pin Lift

1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#
2—MILWAUKEE #163 15" x 24" table, 11" sq.
6—OSBORN, #712J, #712 PJ, 18" x 28" table, 12" sq.
4—SPO #2114P, 21" x 27" table, 600#
1—SPO #2136G, 21" x 30" table, 800#

Jolt Squeezers

2—MILWAUKEE #123, #123-10, 17" x 26" table, 250#
2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL, #12 LJS, 17" x 20" table, stationary and portable
6—TABOR, 3" Jolt, 17 x 20"
2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq.
1—NICHOLS #12 F-P, portable, 600#
51—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400#

MATERIAL HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—Electric Magnet, 47" x 47", 20" deep
1—CLARK, Fork Lift, Gas, 3000 lb. capacity, Solid Tire

MULLERS AND MIXERS

1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.
1—MULLER Plaster & Mortar Mixer, 3 cu. ft. batch, Pneumatic Tires
2—SIMPSON #1, 4 cu. ft. batch, 2 wheels, Open Gear
1—SIMPSON #0, 3' Diameter, 175 lbs.
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch

LADLES AND POURING DEVICES

MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

36" x 66" WHITING Ladle, Tilting Type, Complete w/gas preheating unit, Portable Type

OVENS

1—COLEMAN, OIL, one compartment, recirc., 60" W x 80" H x 14' 6" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, OD. 22' x 12' x 10'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

SAND CONDITIONING

1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
1—ROYER, NDP, 15-25 tons/hr., 2 HP Motor
1—ROYER, NB-2, Portable, 7-10 tons/hr.
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
2—B & P Screenarator, Model "M"

SAND CUTTERS

1—AMERICAN, 15 HP, 96/97 Reel

SHAKEOUTS AND SCREENS

2—HEWITT ROBINS, Vibrating, 18" x 10'
1—HEWITT ROBINS, Vibrex Screen, 3' x 8'
1—SIMPLICITY Screen, 50" x 116"

MISCELLANEOUS

1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
1—PATTERSON-KELLEY Twin Shell Dry Blender, 3 cu. ft. capacity

UNIVERSAL MACHINERY AND EQUIPMENT CO.

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over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

SULLIVAN angle compound, 600 CFM.
3—INGERSOLL RAND, Model ES-1. Size 9 x 9, 225 CFM, 40 HP motor.
1—SCHRAMM WD-50, 15 HP, 50 CFM.

AIR & ELECTRIC HOISTS

85—INGERSOLL RAND Air Hoists, Sizes RC-5, A, B, C, ¼, ½, 1 ton.
15—DETROIT Air Hoists, 1 & 1½ ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, D-6, ¼, ½, 1 and 3 ton capacity.
4—KELLER 1 ton capacity air hoists.

BUCKET ELEVATORS

12—LINK BELT & JEFFREY, 30, 40, 50, 60 ft. cc. 10 x 7, 12 x 7, 14 x 7 buckets.

CUT-OFF MACHINES

1—AMERICAN D Rod Straightener and Shear.
1—DeWALT ME2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.
1—TABOR C10AF—16" wheel, 10 HP.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—REDFORD & MILWAUKEE Bench.
1—SPO Model SC-10-DM Shell Core Blower
1—SAN-BLO, Model CB-40-B, 40# cores.

CORE OVENS

4—CARL MAYER 2-Compartment, oil fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1250-L.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.
1—BOOTH one ton, direct arc, side charge with 1500 KVA Transformer with gear and all controls.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Grey Iron.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type
1—SURFACE COMBUSTION, 54" x 96", box-type, gas fired, 1850° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.

Plain Jolt

1—HERMAN 40" x 72" table, 6000# cap.
1—HERMAN 40" x 58" table, 6000# cap.
1—DAVENPORT 24AJ, 24" x 30" table.
1—HERMAN 8' x 12' table, 32,000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26".
1—SPO #2134, 19" x 27" Table.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors.

Oscillating

1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80'
1—ROBINS Vibra-Veyor 24" W x 100' long x 8" deep pan, New 1953, like new.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7' long, total unit 24" W x 49' long, w/MG set. New 1949.

Roller

2500' MATHEWS 6" & 20" wide, 2 7/8" dia. roller, 12" hex shaft centers, 4" channel.
500—MATHEWS 36" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Muid

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins. 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P #50, Speed Muller, 9 cu. ft.
1—B & P #60, Speed Muller, 12 cu. ft.
2—B & P #70, Speed Mullers, 18 cu. ft.
1—B & P #7, Mulbaro, 700# cap.
1—B & P 3½ Mulbaro, 350# capacity
1—BAKER PERKINS #16½, 30 HP.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
2—CLEARFIELD #920, 25-30 cu. ft.
1—DRAVO-DOYLE 6 cu. ft cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON #0, Style B, 175 lb.
2—SIMPSON #1, Style B, 400 lb.
1—SIMPSON #1, Style UD, 500 lb.
1—SIMPSON #1½, Style UD w/loader
1—SIMPSON #2, Style C, 1500 lb.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu. ft. paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—ROYER S-522-9 Scrap Control 60 ton per hour capacity.
1—AMERICAN "Sand Master," 102"/70" cutting blade—1952.
1—MOULDERS' FRIEND 60" Brush.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—ROBBINS 8' x 10' Model JF-11 Dual
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.
1—HEWITT - ROBINS Vibra - Feeder 30" wide x 60" long.
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN 27" x 36" with skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
1—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53, type EN-2 blast cabinet with dust collector
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.

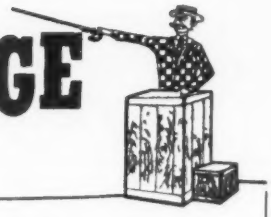
TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD—CLEVELAND 10, OHIO—CALL LI. 1-6545

THE ACME BARGAIN PAGE



BLOWERS
Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor. General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor. Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
1—Whiting-Allis Chalmers Turbo, 5750 CFM 28 oz. 60 HP 440V air pressure Controls.
Whiting Spencer 5600 cfm, 75 HP 220/440, Late.

BUCKET ELEVATORS
16" Belt—32' Centers.
16" Belt—25' Centers.

CONVEYORS, BELTS
24" x 60' Trough.
18" x 126' Flat Belt.

CONVEYORS, VIBRATING
36" x 162' Oscillating Pan Link Belt.
30" x 53' Oscillating Pan Link Belt.

CORE BLOWERS
3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
1—Champion CB 15.
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
2—Redford Bench Type.

CORE GRINDERS
5—Milwaukee 70-9.
1—Owasso #DE-1.

CORE OVENS
1—Thermonic 1800A.

CORE OVEN VERTICAL HORIZONTAL
1—Coleman, combination oil or gas fired 43 carriers 24" x 90" —1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman combination oil or gas fired 43—2 shelf carriers 30" x 144" long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS
Coleman Gas Fired 28'-25" x 42" opening.

NORMALIZING OVEN
Despatch DT 36 Electric—Pit type, 42" x 40" baskets, 220V.

DUST COLLECTORS
Parsons 45,000 cfm.

ELECTRIC CRANE & RUNWAY
270' x 50' Crane Runway with A Frame supports and 2 cranes.
1—P & H 5 Ton OET Crane, 3 motor, 230V D.C., outdoor type, 45' lift with reel for magnet or bucket service.
1—P & H 3 Ton OET Crane, 3 motor, 230V D.C., outdoor type, 45' lift with reel for magnet or bucket service.

ELECTRIC MELTING FURNACES
Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.
Detroit 350#-750# shells 2300V Primary, Complete with controls.

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We have Electric Furnace Transformers in stock from 800 KVA to 2500 KVA. Write us your needs.

FURNACES, ALUMINUM-BRASS
Stroman 1000# hydraulic Tilt-oil.
Eclipse 100# RB stationary gas.
Lindberg 500# ASM 600.

GRINDERS, SNAGGING
2—Hammond 10 WRI D. E. Snag. 20" dia. wheels. 10 HP 220/440 v motors, variable speed drives.
1—3" x 24" U.S. #65, 20 HP 220/440V.
1—7½ HP Hammond D. E. Snag Grinder.

GRINDERS, SWING FRAME
1—3" x 24" x 12" Marschke, 20 HP.
1—3" x 24" x 12" U.S. 15 HP.
1—2½" x 20" x 6" U.S., 10 HP.

HOT METAL CARRIERS
3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

LADLES
2000# Whiting Jr. & Car.
5000# Modern Geared.

MOLDING MACHINES
Jolt Squeezers:
1—Milwaukee 103-11 Staty. Jolt Squeezer, 13½" x 20" table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18" x 21" table.
1—Taccone Model TD4, high production diaphragm molding machine.
2—Milwaukee 104-5 Staty. Jolt Squeezers.
Jolt Squeeze Pin Lifts:
6—712 PJ Osborn, 18" x 28" table.
Osborn 16" Jolt, vibrating squeeze pin lift.

ROLLOVERS
1—Herman 4000# Series 30" x 60" table.
1—Herman 3000# Series 40" x 84" table, special slotted table.
1—Herman 1500# Series 20" x 36" table.
2—Herman 750# Series 20" x 30" table.
2—Herman 750# Series 20" x 24" table.
3—SPO Model 9032.
2—International Type G, Portable, 20" x 8" draw.
3—Tabor Portable Rollover 30".
Johnston & Jennings 1020-44 x 44 max. Flask Size.
Osborn #405 20" x 60" table.

PIN LIFT PUSHOFFS
1—Champion Pin Pushoff 28" x 42" table 10" draw.
2—Milwaukee 620 ND-20" x 24" table.

MULLERS
Clearfield #404, 4' dia. pan.
2—Simpson #2 Unit drive.
Simpson #2, Unit drive, time cycle control.

OVERHEAD TROLLEY CONVEYORS
2000' Jervis B. Webb & Link Belt 678 chain, 2 D.C. motor drives and MG set.

POURING DEVICES
3—Pouring devices, Whiting 500#.

SHAKEOUTS
Link Belt 5' x 10'—7½ HP motor.
1—Simplicity 4 x 6.

SPRUE CUTTERS
2—Perkins #53.
Milwaukee #85.

STRAIGHTENING PRESSES
150 Ton Dual Ram Dennison C Frame Hydraulic, 30" x 108" table.
50 Ton Farquhar.
50 Ton Oil Gear C Frame Hydraulic, 30" x 40" table.
Hannifin S-200, 20 ton.
35 Ton Hannifin.

TESTING EQUIPMENT
Tinius Olsen Brinell Tester.

TUMBLING BARRELS
3—Royersford 42' x 72' Roller Bearing, Chain Drive
1—Sly Square 42 x 42 x 64.
1—Sly 42" Dia. x 56".

WHEELABRATORS
48" x 42" American, bucket loader.
42" x 48" American w/bucket loader.
27" x 36" American w/bucket loader.
20" x 27" American Rubber Belt.

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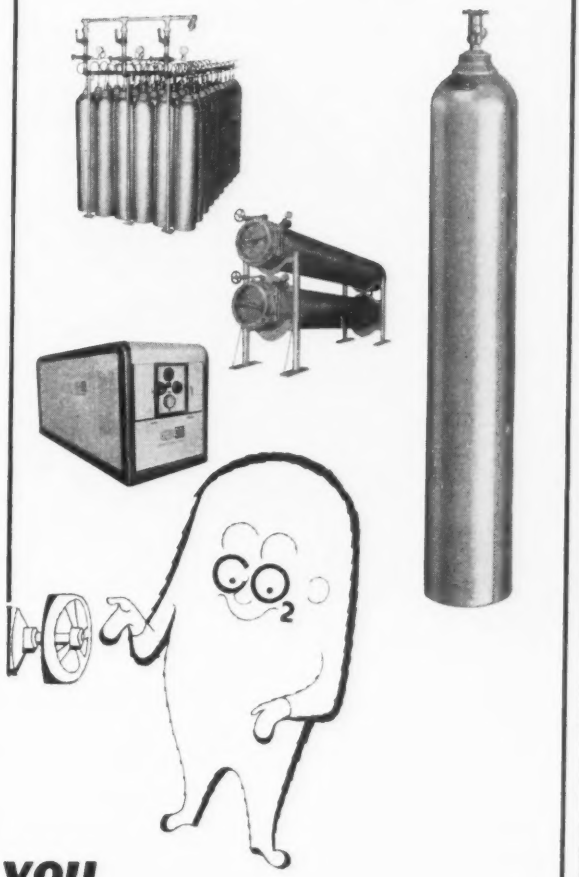

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Circle 766 on Inquiry Card—Page 51

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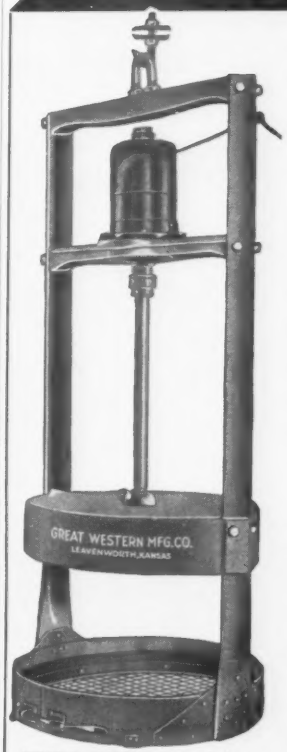

TYPE "CR". Complete price $350.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., ⅓ H.P. enclosed motor.

TYPE "V". Price 20" Sieve, $275.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. 4'6" high, weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $495.00.

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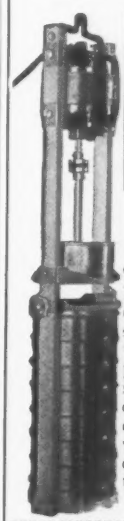

TYPE "HL". Price $250.00 complete, less sieves. Laboratory model especially designed for laboratory sand control fitted with 1/6 H.P. enclosed motor.

TYPE "CS". Complete price $360.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lb., ⅓ H.P. enclosed motor.

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Leavenworth, Kansas Phone MU-22291

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Circle 767 on Inquiry Card—Page 51

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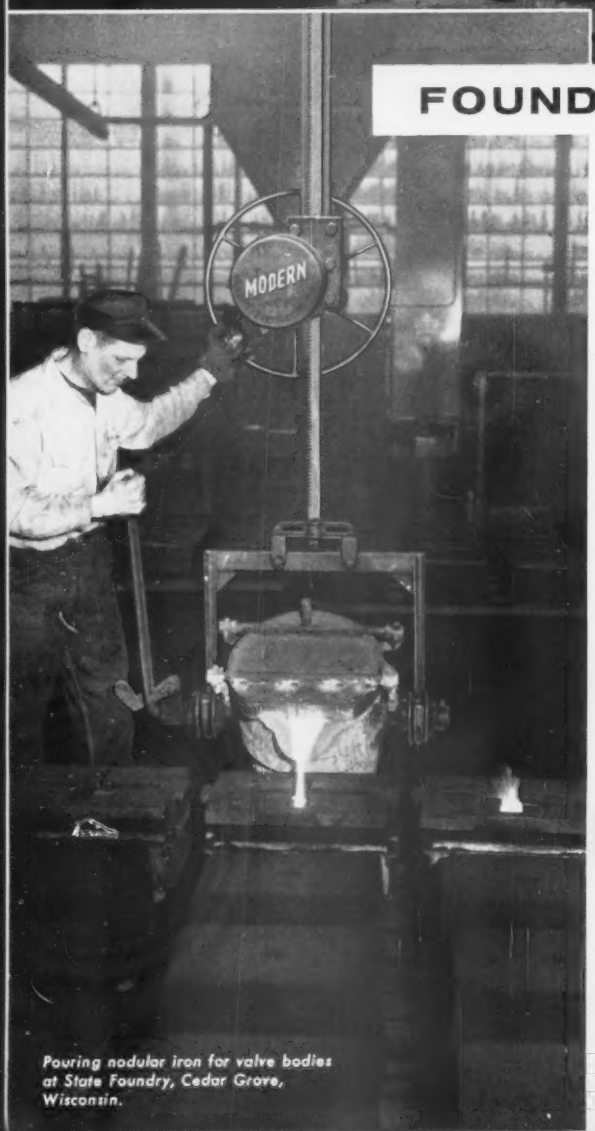
POURING - CONVEYOR OR PALLET

70 tons of gray iron, cylinder liners are poured in 8 hours for Allis-Chalmers tractors.



Pouring nodular iron for valve bodies at State Foundry, Cedar Grove, Wisconsin.

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ferrous and nonferrous all boost tonnages and profits through mechanized, one-man pouring. When ladles and pouring devices are synchronized the MODERN way—

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- **End-of-heat fatigue is minimized . . .**
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MODERN

MODERN EQUIPMENT COMPANY, Dept F-10, Port Washington, Wisconsin

- ☐ Mail catalog on pouring devices and ladles.....P-152-A
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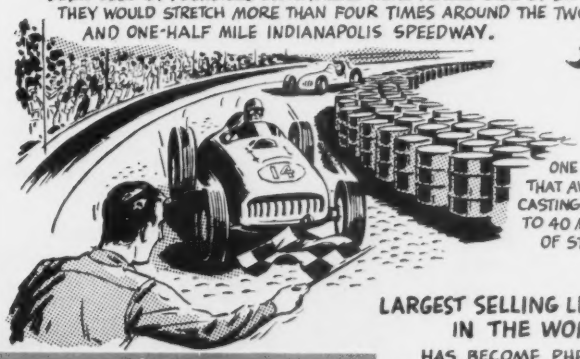
IF DRUMS OF STEVENS LIQUID PARTING THAT HAVE BEEN USED BY FOUNDRIES EVERYWHERE WERE PLACED SIDE-BY-SIDE THEY WOULD STRETCH MORE THAN FOUR TIMES AROUND THE TWO AND ONE-HALF MILE INDIANAPOLIS SPEEDWAY.



NO DUST FOR MOLDERS TO BREATHE

MOLDERS USING STEVENS LIQUID PARTING SAVE TIME IN DUSTING DRY PARTING ON EVERY MOLD. IT ELIMINATES THE DUSTY AIR AROUND MOLDERS... KEEPS BREATHING ZONE CLEAN AND FRESH.

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LARGEST SELLING LIQUID PARTING IN THE WORLD

HAS BECOME PHENOMENAL "BEST-SELLER" BECAUSE OF IT'S GREAT ECONOMY AND MANY VARIED USES.

FOR ECONOMY YOU CAN'T BEAT. . STEVENS LIQUID PARTING

In the Stevens files we have many testimonials from foundries which state they have made up to 60 molds from a single application of Stevens Liquid Parting. We have hundreds of reports of 25 to 50 molds for a single application. That's positive proof of its economy. And it is one of the important reasons why Stevens Liquid Parting is the largest selling liquid parting in the world today.

Consider these additional features: Patterns are left clean, with no adhering sand . . . Molds always give smooth castings because sand separates cleanly . . . Molders save time and increase production since, unlike dry partings, it is not necessary to shake parting on the pattern for each mold . . . It eliminates any need for heating patterns or plates . . . There is no parting dust in the molder's breathing zone.

If you have never tried this great foundry item be sure to make an early test in your own plant soon. Call your Stevens Sales Representative or write direct to Frederic B. Stevens, Inc., Detroit 16. Michigan.

WHAT USERS SAY:

WE TRIED MANY OTHER BRANDS

"After trying several other liquid partings, we tried the Stevens product and must admit its superiority to all others."

NO STICKING IN CORE BOXES

"Since using Stevens Liquid Parting there is no sticking in the core boxes, and they have taken on a 'burnished' appearance. Results are very satisfactory."

SOLVED OUR DIFFICULT CASTING JOB

"Stevens Liquid Parting enabled us to solve a difficult casting job of fins for an air cooled internal combustion engine."

COST IS NEGLIGIBLE

"The cost of Stevens Liquid Parting is negligible. On 625 tons of castings our parting costs were $60.00 or about 10c per ton of casting."

BRANCHES: **BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN**

FOUNDRY FACINGS | GRINDING OPERATIONS | BLAST FINISHING | BARREL TUMBLING | METAL CLEANING | POLISHING & BUFFING | AUTOMATIC FINISHING | AUTOMATIC PLATING | METAL RECLAMATION

Metal Finishing equipment and supplies from castings or stampings to finished product

FREDERIC B. STEVENS INCORPORATED

EVERYTHING FOR A FOUNDRY

DETROIT 16, MICHIGAN

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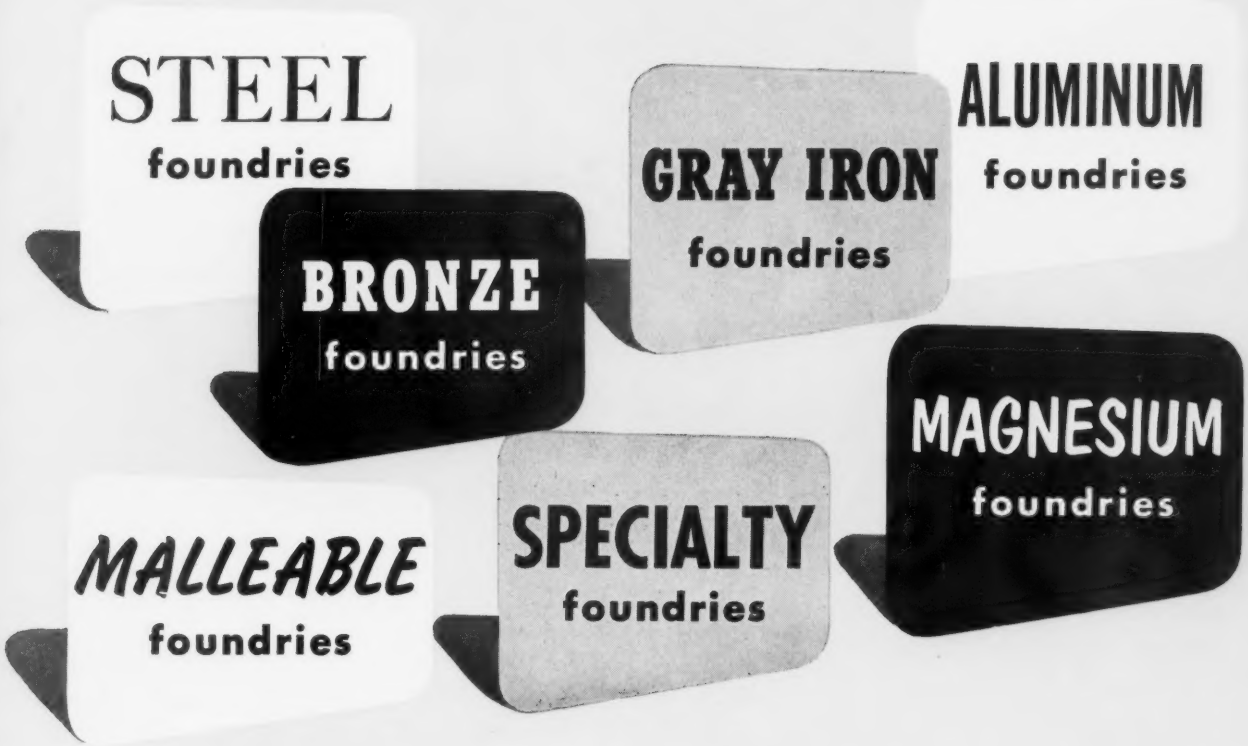

sand, mold and castings handling systems

Engineered— Built and Installed

to meet your individual requirements

● Tailor made to your kind and type of work, your production requirements and plant conditions, Bartlett-Snow foundry systems assure faster delivery — of better castings — at lower cost. Ample working areas, free access to machines and proper arrangement of equipment eliminates stock-piling and re-handling between operations, automating the smooth, efficient flow of material from sand and metal storage to the shipping dock. Our wide experience includes substantial installations in many of the country's newest, best known and lowest cost foundries. Let us work with you on your next project.

DESIGNERS
ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS
ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow